

NOTE: *Information Resources on the Care and Welfare of Dairy Cattle* may be viewed as one complete publication file below, or as individual chapter files dairy.htm.



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# Information Resources on the Care and Welfare of Dairy Cattle

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## **How to Use This Document**

This document contains two introductory articles written by experts in the farm animal welfare field from North America and Europe respectively. Each article ends with a list of references cited by the author. The second section of this publication consists of an extensive bibliography categorized into the following topics: behavior, breeding, feeding, health, housing, husbandry, legislation, reproduction, slaughter, and transport. Citations listed in this section may or may not overlap with articles cited by the introductory authors.

Citations were selected from searches conducted using a variety of agricultural, medical, and life science databases. Within a subject category citations are arranged alphabetically according to the last name of the primary author. Each citation is listed with a set of keywords that describe useful information about the entry. If

a citation is listed from a publication available through the National Agricultural Library (NAL) a NAL call number has been included. Documents in the collection of the National Agricultural Library (NAL) are assigned an NAL Call Number. Information on how to request materials at NAL may be found at: <https://www.nal.usda.gov/borrow-materials>. This section provides information on how to request materials that are included in the collection of the National Agricultural Library (NAL). Please read carefully as there are certain restrictions on media and document types. All patrons are encouraged to explore local library resources first before contacting the National Agricultural Library.

The final section of this document contains an annotated listing of web links for internet sites that include information on the care and welfare of dairy cattle in their content. World Wide Web addresses are listed to access specialized databases, extension materials, and publications produced by a variety of non-profit organizations. Readers are cautioned as to the dynamic nature of the internet and the fact that addresses and content are subject to change.

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## **An Overview of Current Dairy Welfare Concerns from the North American Perspective**

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It is heartening to say that progress has been made in the area of dairy cattle welfare. It is also fair to say that many dairy cattle welfare issues are still present and, in North America, several new issues have surfaced since publication of the last *A Housing, Husbandry, and Welfare of Dairy Cattle* (1995) by AWIC. The intent of this introduction to the bibliography is to share my perspective on current dairy welfare issues as they affect dairy cattle raised in North America. Clearly, this perspective will be less influenced by legislation than the European perspective. This introduction represents my personal viewpoint and not that of the National Agricultural Library or Animal Welfare Information Center. My recommendation to readers is to avail themselves of the well-organized bibliography to draw their own conclusion on the status of dairy cattle welfare.

Some welfare issues persist through time in the management of dairy cattle. These include animal abuse and neglect, lack of adequate nutrition and housing, lack of treatment for disease or injury, transportation and marketing practices, slaughter and pre-slaughter handling, breeding practices and appropriate disaster management. Along with these issues are factors that have arisen more recently due to the establishment of larger dairy herds in certain parts of the country. These include provision of shade or other cooling mechanisms, the time period cows stand on concrete or other hard surfaces prior to entering the milking parlor and lameness. Emergent issues for dairy cattle in North America are the use of recombinant bovine somatotropin (BST) and the practice of tail docking.

Identifying appropriate well-being in production systems is at best a complex issue as many interrelated variables impinge on animal welfare. Certainly, welfare within a production system can vary as much as between systems. Key components can, however, be identified and those include (but are certainly not limited to) the human-animal interaction, the physical environment, and the animal's social environment. Part of the issue in identifying welfare in relation to management systems is that it is often a subjective measure of the entire production system. Scientific studies can reveal changes in physiology or behavior with varying management practices and environmental conditions but this science is not always applicable to assessment of

animal welfare in the entire production system (Fregonesi and Leaver, 2001). We can conduct science to understand the preference of animals for their environment, however this is not always clearly related to proper animal welfare as animal preferences may change with changing environmental conditions. For example, (Fregonesi, 1999) found that dairy cows preferred to lie and stand in a straw bedded environment. Depending on management of the straw, udder health and well-being could be affected by blindly imposing this type of system not to mention environmental concerns in handling the excess straw as a waste product.

## **Human-Animal Interaction**

Behavior is a key discipline for understanding cattle welfare. Strides have been made in studying dairy cattle behavior particularly as it relates to the human-animal bond and the animal's fear response. We now have a number of studies that illustrate that the symbiotic relationship between caretaker and cow is one of the principle factors in determining positive animal welfare. Fearfulness in cattle affects productivity and can become increasingly severe, A fearful cow tends to be more difficult to handle, resulting in an elevated negative human response which promotes additional fearfulness by the cow. The behavior section of this bibliography contains several references to the human-animal interaction and relevance to welfare (see in particular Jago et al., 1999; Morgensen et al., 1999; Munksgaard et al., 1997; Rushen et al., 1999).

Acute events and stressors that are more chronic can affect welfare. Chronic stress may ultimately lead to alterations in the animals ability to react to novel stimuli within their environment and they may become hypo or hyper reactive to such stimuli (Boissy et al., 2001). More recently we have seen the concept of positive human-animal interaction and welfare extended to fear responses, health and productivity of calves in veal units (Lensink et al., 2001). Obviously, this is a fruitful area of research and an important one for further studies.

## **Physical Environment**

It is estimated that about 25% of all dairy cattle in North America are housed in a free-stall environment. Here cows can enter and leave the stall at will. The stall has some form of bedding material such as sand, sawdust or possibly straw. Research has shown that a properly designed stall is necessary for proper animal welfare with key points being adequate numbers of stalls, length sufficient to prevent the udder from contacting manure in the gutters and comfort of the bedding material within the stall. The most predominant environment for dairy cattle in North America remains the tie-stall, where the cow is confined to the stall by a neck tether, which allows her to lie down, but not to turn around within the stall or leave the stall at will. A minority of dairy cows are kept on pasture throughout the year. The use of straw bedded loose housing systems (developed in Europe) are not utilized to any great extent in North America. Lying times for cows tend to be greater for cows in loose housing and freestall systems but this is dependent on management of the environment within each system. Certainly, welfare can be affected by these environmental conditions but few side-by-side comparisons of all systems exist to provide definitive information on which system is best for cow welfare.

Use of dry lot environment for dairy cows has become increasingly popular. This is due to the increase in size and number of dairies in the western and southwestern states of the US. These dry lot environments consist of large dirt paddocks with a central milking parlor. Sometimes cattle will have access to shade or other cooling device within the dry lot. Concern has recently arisen regarding the time period animals in large groups stand on hard surfaces while waiting to be milked and its association with increased lameness and culling rates for lameness in these herds. This is a particular concern for dairies with large numbers of cows and insufficient milking parlors. Cooling high-producing dairy cows has always been an issue in hot climates and may have reached its pinnacle in drylot systems as genetic selection for high productivity in more temperate climates may have negatively influenced the dairy cow's ability to adapt to heat stress (Ravagnolo et al., 2000).

Calf rearing practices where animals are individually housed and cannot turn around can be a welfare issue. These young animals are social and in some environments, they are unable to express social behavior completely. Many European systems, particularly straw-bedded group housing systems have been developed but are not used to any extent in North America. Again, it is a question of having solid research data comparing, in

the same study, all systems with consideration of animal welfare, productivity, economics, and environmental impact. Until such information is available, we will continue to question which environments and production systems are best for calves.

## **Social Environment**

Welfare in group housed dairy animals is strongly affected by the social environment. Animal density and mixing of cattle are disruptive to the social order and can certainly impact welfare. Cattle have elaborate social structures, being group animals and we have found that their behavior is more complex than what was thought earlier. They can show complex learning, leading us to rethink the effects of some management practices used on dairy cattle well-being. How we incorporate new heifers into an established group of cows or train heifers to the routine of milking is an area that has recently received more research attention. As we attempt to reduce stress on these animals and improve their welfare, additional questions regarding their cognitive abilities will need to be addressed by research.

## **Health Issues**

Lameness certainly stands out as a consequential and complex welfare problem in dairy cattle. The complexity arises because lameness is an overt sign of many clinical, environmental and management problems. Many factors influence hoof health including genetics, conformation, diet, contagious agents, hygiene, housing system, animal behavior and management (Bergsten, 2001). A key issue in the problem of lameness has been our inability to detect it at an early stage. Recent research by Rajkondawar et al. (2001) indicates that it may be possible to use engineering tools to identify lameness in the cow in its very early stages where it is still easily treatable with a high probability of success. Continued research along these lines will assist dairy producers in their constant fight against the huge welfare problem of lameness. The associations between social rank, behavior and lameness have also recently been studied showing that lower ranking cows spend more time standing. The lower the social rank of the individual cow, the higher the probability that she will become lame (Galindo and Broom, 2000).

Recombinant bovine somatotropin or BST has been a controversial issue in both Europe and North America. Estimates suggest that over the past eight or so years since BST has been available for use in this country (FDA approval occurred on November 5, 1993), approximately 25% of US producers use BST in their herd (Fetrow, 2001). The European Union (EU) however, continues to prohibit the marketing and use of BST based on a report from their Scientific Committee on Animal Health and Animal Welfare that concluded that BST should not be used from the standpoint of its effect on cow health and welfare. Is BST a welfare issue? Clearly, it is a political "hot potato". If one considers the average time period in which cows spend in the milking herd as an indicator of welfare, then the use of BST could be a welfare issue (Kronfeld, 2000). How much is too much production? High production is correlated with both lameness and mastitis. The EU cited both of these issues as indicators to ban the use of BST in the EU.

Dehorning, or the removal of the horn buds in young calves (mainly replacement heifers) has been practiced for a number of years. Non-mechanical means of ridding cattle of horns, such as genetic selection for polled (animals without horns) dairy cattle has received little attention from the dairy industry. Since we continue the practice of dehorning, current research has focused on developing analgesic agents for dehorning calves including nonsteroidal anti-inflammatory drugs such as ketoprofen (Faulkner and Weary, 2000). As long as these standard agricultural practices are used, improving the number and availability of analgesic (particularly long lasting) agents will be a productive topic for research.

The practice of tail docking has increased in North America of late. The practice first became popular in New Zealand as a prevention against the infection of milkers with Leptospirosis. In its early history the practice of tail docking was thought to reduce mastitis as well, although no scientific evidence substantiates this claim. As a scientist, I am astonished at the behavioral and physiological response of adult cows after having a tight rubber ring placed in between the vertebrae of their tails. Cows showed no behaviors that would be suggestive of a pain

or stress response (Eicher et al., 2000). On the other hand, research reports from the scientific community have suggested that docking tails may be detrimental to cows at a later time which would in fact affect their long-term welfare. Several studies in both New Zealand and North America have shown that behavior of cattle in response to flies is changed following tail docking.

## Legislative Issues

Without doubt, transport of "downer cows" or nonambulatory animals is an issue, which still has not been fully addressed. Grandin (1998) reported that a large proportion of the severely lame animals arriving at slaughter are dairy and that the handling of these animals at the packing plant remains a welfare issue. Clearly, research to identify on-farm management to prevent nonambulatory cattle is needed. The legislative bent to this issue is to amend the current Code of Federal Regulations (Title 9, Section 313.2) to allow USDA inspectors to conduct ante-mortem inspection of cattle before they are removed from the transport vehicle. If this were possible, the nonambulatory animal could be euthanised before removal from the truck. The US Animal Health Association Animal Welfare Committee has also been working towards drafting language that could be used on a state-by-state basis to prohibit the transportation of nonambulatory animals.

Dairy cattle have received less attention from the general public and animal activist groups as having welfare problems. Society may view dairy cows as well treated, usually kept in social groups with access to a barn, pasture, food and water. This does not mean that research on dairy cattle welfare is not necessary. What should be emphasized in the future is a holistic approach to identify production systems where animal welfare is a key component along with production, food safety and environmental issues. We have made progress, as evidenced by this revised bibliography. I hope that a review of the materials presented in this bibliography will ignite the academic community and those involved in the dairy industry to continue to improve the welfare of dairy cattle under our stewardship.

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## Abstract

The continuing success of the dairy industry depends upon public perception of the products. If products and production methods were perceived to be bad in respect of human health, the welfare of the animals or the impact of the environment, sales could be severely affected. Animal welfare is of major concern now in many countries and concern is growing in most countries. The welfare of an animal is its state as regards its attempts to cope with its environment. Hence welfare varies from good to poor and includes the health and feelings of an animal as well as aspects of its behaviour and physiology.

Welfare is poor in dairy cows when, for example, they are lame, have mastitis, are unable to reproduce, are unable to show normal behaviour, show emergency physiological responses, or are injured. Poor welfare can be caused by cruelty or poor management but it is also commoner as production efficiency increases. Mastitis, lameness and reproductive failure tend to increase as milk yield increases. Hence it may well be necessary to stop using genetic selection and some feeding methods to increase milk yield. Cows are well adapted to high fibre, low density foods and moderate milk yields so there are more problems when their normal biological functioning controls are overtaxed, i.e. when they are stressed. Bovine somatotrophin increases the risk of poor welfare, especially when given to cows which are already relatively high yielding.

The design of accommodation for cows, and management procedures, also have considerable effects on cow welfare. Cubicle houses, particularly when cubicles are too short or otherwise poorly designed, tend to result in too much lameness and other problems. Straw yards are generally better for welfare if well managed. Lameness is much rarer in cows at pasture although special paths are needed in areas with sharp stones. Housed cows can vary individually in their susceptibility to lameness according to their social position.

Farm operations and increasing automation on farms also require careful monitoring if poor welfare is to be minimised. Indeed efforts should be made to provide conditions in which welfare is good; individual production will then be better.

## Public Perception of the Dairy Industry

Most members of the public who are asked about the dairy industry think of cows grazing in fields and living for some time whilst a series of calves are born and milk is produced. Milk products are considered by the public in relation to their effects on human nutrition and health, their effects on the environment and their effects on animal welfare. If production is perceived to be bad in relation to any of these aspects, sales of the products could be severely affected. Some people may limit their intakes of milk products because of a desire to reduce cholesterol intake and certain aspects of the dairy industry, such as methane production, may be criticised in relation to pollution but it is animal welfare rather than these topics which is the subject of this paper. Until recently, the welfare of the cow was not often perceived to be poor and it has been only in calf rearing that dairy production systems have been regularly criticised. However, the industry has been changing and evidence of poor welfare in cows is accumulating and has had influence on public opinion in several countries. It is important to the dairy industry that welfare problems should be addressed before there is any widespread public condemnation of breeding and management practices. A few critical newspaper articles or television programmes which appear well founded can be very damaging to producers, processors and retailers.

Public concern about animal welfare manifests itself in actual product purchasing and in pressure applied to retailers and to legislators. Major supermarket and cooked food chains can be influenced rapidly by customer pressure and can cause changes to be brought about in the methods used by suppliers. Retailers may impose codes of practice on suppliers and the execution of these codes is checked because the retailers cannot afford public criticism of what they sell (1). In several European countries, certain housing systems and farm practices have been changed by many farmers because of the standards required by the purchasing companies. For example the use of crates for calves, stalls and tethers for sows and castration of pigs slaughtered at 100 kg or less has ceased on many farms.

Effects of public pressure on legislation is usually slower but legislation makes for more equal constraints on producers. Legislation is becoming more and more international although it is clearly important that where there is legislation on wholly moral grounds, for example in order to prevent poor welfare in animals, there should be restrictions on imports from countries whose moral standards are lower and that such restrictions should be authorised by the World Trade Organisation.

## The Concept of Animal Welfare

Animal welfare has to be defined in such a way that it can be scientifically assessed and the term can be used in legislation and in discussion amongst animal users and the public. Welfare is clearly a characteristic of an individual animal and is concerned with the effects of all aspects of its environment on the individual. The welfare of an animal is its state as regards its attempts to cope with its environment (2). This state includes the feelings of the individual, various physiological and behavioural responses and its health. The extent of the difficulty which the individual has in trying to cope with its environment, the extent of any failure to cope and the degree of happiness are all components of welfare. Hence welfare varies from very poor to very good and can be scientifically assessed (3,4,5,6).

Indicators of animal welfare are listed in [Table 1](#). These include disease prevalence and reduced ability to grow and breed. As explained by Broom and Johnson (3), the welfare of a diseased individual is poorer than that of an individual which is not diseased and reduced ability to produce offspring given appropriate opportunities also indicates poor welfare. Individuals which are finding it difficult to cope with their environment, or which are failing to cope may be more likely to become diseased, less likely to produce embryos, less likely to carry young to term and more likely to die early.

**Table 1. Indicators of animal welfare (from Pryce *et al*, 36).**

- \$ Physiological indicators of pleasure
- \$ Behavioural indicators of pleasure
- \$ Extent to which strongly preferred behaviours can be shown
- \$ Variety of normal behaviours shown or suppressed
- \$ Extent to which normal physiological processes and anatomical development are possible
- \$ Extent of behavioural aversion shown
- \$ Physiological attempts to cope
- \$ Immunosuppression
- \$ Disease prevalence
- \$ Behavioural attempts to cope
- \$ Behaviour pathology
- \$ Self narcotization
- \$ Body damage prevalence
- \$ Reduced ability to grow or breed
- \$ Reduced life expectancy

Welfare can be poor in any animal if it is ill-treated or neglected. This can be a problem occasionally but most dairy farmers value their animals too much to allow either of these causes of poor welfare to occur. However, there can be ill treatment of cattle going to slaughter. The general areas of cattle welfare problems have been reviewed (7) and many of these will not be reported here.

## The Welfare of Veal Calves

Scientific studies of the welfare of veal calves have been reported in detail by Broom (8) and in the Report on the Welfare of Calves by the E.U. Scientific Veterinary Committee (Directorate-general for Agriculture VI/5891/95). Amongst the needs of calves which are not met during veal production in crates are: resting in normal postures, turning around and exercising adequately, exploration, normal grooming, social contact, normal gut development and avoidance of anaemia with associated immunosuppression and disease.

Well managed group-housing systems in appropriately ventilated buildings had no more disease than individual-housing systems (9). Anaemic calves with a blood haemoglobin level of  $5.5 \text{ m mol l}^{-1}$  are adversely affected by exercise (10) and immune system function was adversely affected at  $4.5 \text{ m mol l}^{-1}$  (11). Confined calves show prolonged inactivity, excessive licking and sucking behaviour with consequent hair-ball formation in the gut, oral stereotypies and locomotor difficulties (12,13,14,15). All of these abnormalities of behaviour indicate poor welfare caused by confinement and lack of normal stimulation. Confined calves also show greater cortisol response to ACTH challenge than group-housed calves (16, 17 and lack of fibre and iron in the diet causes abnormalities of gut anatomy and physiology (11,18,19).

As a consequence of the evidence of poor welfare in veal calves, the European Union passed a Directive in 1997 which required group-housing of calves after 8 weeks of age, individual pens at least as wide as the height of the calf at the withers, no tethering of calves except for <1 h at feeding time, sufficient iron to ensure an average blood haemoglobin of  $4.5 \text{ m mol l}^{-1}$  and fibre in the diet increasing from 50 g per day at 8 weeks to 250 g pr day at 20 weeks. Many E.U. calf producers have found group-housing of calves to be more successful economically than the old crate system and white veal can still be produced from systems which comply with the new law.

## The Welfare of Cows

The major welfare problems of dairy cows are lameness, mastitis, and any conditions which lead to impaired reproduction, inability to show normal behaviour, emergency physiological responses or injury.

### Leg and foot problems

For a recent review of lameness, including the extent to which it is a welfare problem, see Greenough and Weaver (20). Almost all animals which walk with a limp, or reduce walking to a low level, or avoid walking whenever possible suffer from some leg or foot pain. Their ability to carry out various preferred behaviours is generally impaired and there may be adverse consequences for various other aspects of their normal biological functioning. Lameness always means some degree of poor welfare and sometimes means that welfare is very poor indeed.

Measurements of the extent to which some degree of lameness occurs in dairy cows include 35 - 56 cases per 100 cows per annum in the USA, 59.5 cases per 100 cows per annum in the UK, and more than 83% of examined cows in the Netherlands. The actual figures depend upon the method of assessment and most of these cases were not treated by veterinary surgeons but there is no doubt that lameness is often a severe welfare problem.

### Mastitis

Mastitis in mammals is a very painful condition. The sensitivity to touch of affected tissues is clearly evident and there is obvious damaging of normal function. Mastitis prevalence should have declined greatly with improved methods of prevention and treatment but it has not declined as much as it should have done. Webster (21) reports 40 cases of mastitis per 100 cows per year as an average for the UK.

## Reproductive problems

Reproductive problems in dairy cows have become very common in recent years with large numbers of cows being culled because of failure to get in calf. In a study of 50 dairy herds in England, Esslemont and Kossaibati (22) found that farmers reported failure to conceive as the predominant reason for culling with 44% of first lactation, 42% of second lactation and 36.5% of cows in total being culled for this reason. However, mastitis, feet and leg problems, ketosis and other disease conditions can lead to reproductive problems and it is difficult to discover their initial cause from farmers' records. A report by Plaizier *et al* (23) concerning Canadian herds indicated that reproductive culling risk varied between 0 and 30% with a mean of 7.5%.

## Housing systems and welfare

The incidence of lameness is much worse in housed cows than in cows at pasture. Cows at pasture may have stone damage to hooves if they do not have a suitable place to walk but wet cubicle houses or poorly maintained straw yards can result in very high levels of lameness. Even the best cubicle housing systems seem to have some lameness problems which are exacerbated by social factors (24). Since the best straw yards, with an abrasive area on which normal hoof wear occurs, have little lameness, these may be the best solution for housed cows. Mastitis incidence is affected by hygiene at milking and various other conditions of management. Poorly designed housing systems can result in a variety of welfare problems and these can be exacerbated by high stocking density. Most of these problems, such as those resulting from cubicles being too short for the length of the cows now occupying them or of poor design of cubicles which do not allow adequate movements in the cow, are well known so are mentioned briefly here. In general it seems that many dairy cow housing systems, and cubicles in particular, do not provide an environment to which cows can adapt easily. The best straw yards seem to be the most successful as they give the cows more opportunity to control their interactions with their environment.

## Milk yield and welfare in dairy cows

The dairy cow of 1998 may produce 18000l. or more of milk per annum with a peak milk yield of 75l. per day. This compares with UK figures of 6000l. and 30l. per day 10 years ago (21) and a beef cattle average of 1 - 2000l. and 10l. per day. The dairy animal is producing considerably more than its ancestor would have. This raises questions of whether it is at or beyond its maximum production level and the extent of any welfare problems.

The peak daily energy output of the dairy cow per unit body weight is not very high in comparison with some other species such as seals or dogs but the product of daily energy output and duration of lactation is very high indeed. Hence long term problems are the most likely to occur (25). This is what we see because, although some cows seem to be able to produce at high levels without welfare problems, the risk of poor welfare indicated by lameness, mastitis or fertility problems is greater as milk yield increases.

The steady increase in reproductive problems as milk yields have increased is well known. As Studer (26) states, "despite programmes developed by veterinarians to improve reproductive herd health, conception rates have in general declined from 55-66% 20 years ago to 45-50% recently (27,28,29,30). During the same periods, milk production has greatly increased."

Studies showing that milk yield is positively correlated with the extent of fertility problems have come from a range of different countries (31,32,33,34,35,36,37). Studer (26) explains that high producing cows which are thin and whose body condition score declines by 0.5 - 1.0 during lactation often experience anoestrus. A loss of condition score of about 1.0 during lactation was normal in the review presented by Broster and Broster (38).

Data on the relationships between milk yield and reproduction measures from two large scale studies are presented in Tables [2](#) and [3](#).

In some studies, effects of health problems on reproduction are evident, for example Peeler *et al* ([39](#)) showed how cows which were lame in the period before service were less likely to be observed as being in oestrus. The lameness could be more likely in high producing cows. Direct links between level of milk production and extent of disease conditions are also evident from a range of studies, positive correlations being reported by Lyons *et al* ([40](#)), Uribe *et al* ([41](#)) and Pryce *et al* ([36,37](#) see Tables [2](#), [3](#)). In addition to mastitis and leg and foot problems, which are often measured in such studies, the occurrence of other clinical conditions can also be affected by production level. Modern, high producing cows with good body condition have a high incidence of milk fever, retained placenta, metritis, fatty liver and ketosis ([26](#)).

**Table 2. Positive correlations between milk production level and indicators of poor welfare (from Pryce *et al*, [36](#)).**

Milk yield from 33,732 lactation records:

calving interval	0.50	+	0.06
days to first service	0.43	+	0.08
mastitis	0.21	+	0.06
foot problems	0.29	+	0.11
milk fever	0.19	+	0.06

**Table 3. Positive correlations between milk production level and indicators of poor welfare (from Pryce *et al*, [37](#)).**

Milk yield from 10,569 lactation records:

calving interval	0.28	+	0.06
days to first service	0.41	+	0.06
mastitis	0.29	+	0.05
somatic cell count	0.16	+	0.04
foot problems	0.13	+	0.06

The high yields of modern dairy cows are a consequence of genetic selection and feeding. Cows are adapted to high fibre, low density diets. The ways in which they have been modified genetically do not change these basic characteristics much. Cows do not adapt easily to high grain diets or to manufactured diets with high protein and low fibre. Genetic selection has not taken adequate account of the adaptability and welfare of cows. Current trends towards ever greater milk production and feed conversion efficiency should not be continued unless it can be insured that welfare is good ([42,43](#)). Bovine somatotrophin (BST) results in high milk yields and higher levels of mastitis, lameness, reproductive disorders and other problems such as those at the injection site ([44,45,46,47,48](#)). Whether or not much of the effect of the genetically engineered hormone is a consequence of the milk yield, the poorer welfare caused by the BST is unacceptable.

The Report of the E.U. Scientific Committee on Animal Health and Animal Welfare on *Animal Welfare Aspects of the Use of Bovine Somatotrophin* concluded that the use of BST as follows.

BST is used to increase milk yield, often in already high-producing cows. BST administration causes substantially and very significantly poorer welfare because of increased foot disorders, mastitis, reproductive disorders and other production related diseases. These are problems which would not occur if BST were not used and often results in unnecessary pain, suffering and distress. If milk yields were achieved by other means

which resulted in the health disorders and other welfare problems described above, these mans would not be acceptable. The injection of BST and its repetition every 14 days also causes localised swellings which are likely to result in discomfort and hence some poor welfare.

The Committee also made the following Recommendation. BST use causes a substantial increase in levels of foot problems and mastitis and leads to injection site reactions in dairy cows. These conditions, especially the first two, are painful and debilitating, leading to significantly poorer welfare in the treated animals. Therefore from the point of view of animal welfare, including health, the Scientific Committee on Animal Health and Animal Welfare is of the opinion that BST should not be used in dairy cows.

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encouragement). Stage of lactation affected total lying time, number of lying bouts, maximum bout length and rising behaviour, while lactation number only had a minor effect on lying behaviour. The proposed score for rising reliably reflected whether the cows in tie-stalls had difficulty rising when at least three observations were included. The proportion of cows in different stages of lactation and of different parities should be included in any assessment of rising behaviour, since stage of lactation and parity significantly affected rising behaviour.

Keywords: dairy cows, Friesian, breed, tethered housing, posture, rest, duration, lactation stage, lactation number, physical activity, animal behavior, animal welfare.

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NAL Call No.: 44.8 J822  
Keywords: dairy cows, behavior, social dominance, group dynamics, animal welfare, wellbeing, housing, feed intake, feeding behavior, stocking density, overcrowding.
- Haley, D.B., J. Rushen, J., and A.M. De Passille (2000). **Behavioural indicators of cow comfort: activity and resting behaviour of dairy cows in two types of housing.** *Canadian Journal of Animal Science* 80 (2):

257-263, ISSN: 0008-3984.

NAL Call No.: 41.8 C163

Keywords: housing, pens stalls, animal behavior, rest, behavior patterns, diurnal activity, animal welfare.

Hartmut, F. (1999). **Method to assess the learning ability of group-housed calves and results of visual discrimination tasks.** *Archiv fuer Tierzucht* 42(3): 241-254, ISSN: 0003-9438.

NAL Call No.: 49 AR23

Keywords: more-arm-maze test assessment method, group housing, learning ability assessment, visual discrimination task.

Hasegawa, N., and H. Hidari (2001). **Relationships among behavior, physiological states and body weight gain in grazing Holstein heifers.** *Asian Australasian Journal of Animal Sciences* 14 (6): 803-810.

NAL Call No.: SF55 A78A7

Keywords: dairy heifers, Holstein, breed, behavior, performance, pasture, rotationally grazed, body weights, blood samples, rumen fluid samples, chemical composition of forage, crude protein, dry matter, acid detergent fiber, grazing time, phospholipid concentration of blood, acetic acid proportion, butyric acid proportion.

Hassall, S.A., W.R. Ward, and R.D. Murray (1993). **Effects of lameness on the behaviour of cows during the summer.** *The Veterinary Record: Journal of the British Veterinary Association* 132(23): 578-580, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: dairy cattle, animal welfare, pain, productivity, animal behavior, milking parlor, feeding behavior, ruminating, lying, standing.

Helin, J., A. Katainen, E. Manninen, M. Norring, K. Kaustell, and H. Saloniemi (2001). **The use of an automatic concentrate feeding station in a loose housing system for dairy cattle. Part 1: Disturbance at the feeding station. [Vakirehuautomaatin kaytto lypsylehmilla pihattonavetassa. Osa 1: Hairinta vakirehuautomaatilla.] Suomen Elainlaakarilehti** 107 (10): 562-567, ISSN: 0039-5501.

NAL Call No.: 41.8 F49

Keywords: dairy cows, loose housing system, automatic feed dispensers, concentrates, feeding behavior, restricted fed, butting, pushing rate of disturbance, Finnish language.

Hindhede, J., L. Mogensen, and J.T Sorensen (1999). **Effect of group composition and feeding system on behaviour, production and health of dairy heifers in deep bedding systems.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 49(4): 211-220, ISSN: 0906-4702.

NAL Call No.: S3.A27

Keywords: housing, animal behavior, health, animal welfare, feed intake, liveweight gain, feeding, cattle, nutrition programs, heifers, concentrates, dairy herds, group size, litter, productivity, aggression, stress, groups.

Hoerning, B., and J. Tost (2001). **Influences on the resting behaviour of dairy cows in loose housing systems.** *Advances in Ethology* (36): 178, ISSN: 0931-4202.

NAL Call No.: 410 Z35B

Keywords: dairy cows, loose housing system, resting behavior, stable.

Hopster, H. (1998). **Coping Strategies in Dairy Cows** Landbouwniversiteit Wageningen (Wageningen Agricultural University): Wageningen, Netherlands, 152p., ISBN: 9-05-485842-7152.

Keywords: thesis, cows, dairy cattle, milking parlors, management, animal welfare, animal behavior, stress, adaptation, cortisol, adrenocortical activity, heart rate, blood sampling, adaptation, animal welfare, leukocytes, endotoxins, behavioral routines, calf separation, social isolation, emotional responses.

Hopster, H., J.T.Nvd Werf, and H.J. Blokhuis (1998). **Side preference of dairy cows in the milking parlour and its effects on behavior and heart rate during milking.** *Applied Animal Behaviour Science* 55(3/4):

213-229, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, side preference in milking parlor, heart rate, animal behavior, milk yield, animal welfare.

Horning, B., C. Zeitlmann, and J. Tost (2001). **Differences in the behaviour of dairy cows in the lying area of 40 loose houses.**[**Unterschiede im Verhalten von Milchkühen im Liegebereich verschiedener Laufstallsysteme.**] *KTBL-Schrift* 403: 153-162.

NAL Call No.: 18 K96

Keywords: dairy cows, behavior, housing, cubicles, lying time, straw yards, bedded slope floors, German language.

Hultgren, J. (2001). **Effects of two stall flooring systems on the behaviour of tied dairy cows.** *Applied Animal Behaviour Science* 73(3): 167-177, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: behavior, resting behavior, slipping behavior, cow housing, tethered housing, tie stalls, solid floors, slatted floors, mats, litter, wood shavings, straw, animal welfare.

Hultgren, J. (2001). **Observational and experimental studies of the influence of housing factors on the behaviour and health of dairy cows.** *Acta Universitatis Agriculturae Sueciae: Veterinaria* (No. 104), Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences: Uppsala, Sweden, 25 p., ISSN: 1401-6257.

NAL Call No.: SF615.A28

Keywords: dairy cows, animal behavior, health, animal welfare, bovine mastitis, diseases, housing, cow trainers, culling, hygiene, floor type, foot diseases, ketosis, litter, loose housing, mastitis, mats, reproductive performance, slatted floors, tethered housing, Sweden.

Illmann, G. and M. Spinka (1993). **Maternal behaviour of dairy heifers and sucking of their newborn calves in group housing.** *Applied Animal Behaviour Science* 36(2/3): 91-98, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: heifers, newborn calves, group housing, parental behavior, sucking behavior, maternal behavior.

Jago, J.G., C.C. Krohn, and L.R. Matthews (1999). **The influence of feeding and handling on the development of the human-animal interactions in young cattle.** *Applied Animal Behaviour Science* 62(2/3): 137-151, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, artificial rearing, feeding, handling, approach behavior, group size, liveweight gain.

Jensen, M.B. (2001). **A note on the effect of isolation during testing and length of previous confinement on locomotor behaviour during open-field test in dairy calves.** *Applied Animal Behaviour Science* 70(4): 309-315, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, dairy cattle, housing, isolation, physical activity, social behavior.

Jensen, M.B. and R. Kyhn (2000). **Play behaviour in group-housed dairy calves, the effect of space allowance.** *Applied Animal Behaviour Science* 67 (1-2): 35-46, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cattle, animal welfare, farm management, group housing, environment, play behavior, locomotor play, novel environment, age differences, open-field test, positive feelings, social play, space allowance.

Jensen, M.B. and R. Kyhn (2000). **Play behaviour in group-housed dairy calves, the effect of space allowance.** *Russian Journal of Ecology* 67(1/2): 35-46, ISSN: 1067-4136.

NAL Call No.: QH540 E32

Keywords: dairy cattle, Danish Holstein Friesian calves, locomotor play, open-field test, animal behavior, calf housing, pens, animal welfare, Denmark.

Jensen, M.B., L. Munksgaard, L. Mogensen, and C.C. Krohn (1999). **Effects of housing in different social environments on open-field and social responses of female dairy calves.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 49(2): 113-120, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: effects, housing, social environment, open field responses, group housing, individual housing, loose housing, tethered housing, social behavior, social tests.

Jensen, M.B., K.S. Vestergaard, and C.C. Krohn, and L. Munksgaard (1997). **Effect of single versus group housing and space allowance on responses of calves during open-field tests.** [Erratum: Dec 28, 1998, v. 61 (2), p. 185.] *Applied Animal Behaviour Science* 54(2/3): 109-121, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, heifers, housing, fearfulness, heart rate, behavior patterns, animal welfare.

Johannesson, T. and J.T. Sorensen (2000). **Evaluation of welfare indicators for the social environment in cattle herds.** *Animal Welfare* 9 (3): 297-316, ISSN: 0962-7286.

NAL Call Number: HV4701.A557

Keywords: dairy cows, stocking density, loose housing, body weight, group size, change, milk yield, agonistic behavior, posture, blood serum, hydrocortisone, animal behavior, health, animal welfare, literature reviews.

Juhas, P., O. Debreceni, V. Zimmermann, and V. Klisky (2001). **Abnormal behaviour in dairy cattle in Slovakia.** *Advances in Ethology* (36): 187, ISSN: 0931-4202.

NAL Call No.: 410 Z35B

Keywords: abnormal behavior, housing condition, milk sucking, tongue playing, Slovakia, Europe.

Jung, J., and L. Lidfors (2001). **Effects of amount of milk, milk flow and access to a rubber teat on cross sucking and non nutritive sucking in dairy calves.** *Applied Animal Behaviour Science* 72 (3): 201-213, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: Bos taurus, dairy calves, effects of different amounts of milk, flow rate of milk, and access to a teat, non nutritive sucking, empty teat, cross sucking on other calves.

Katila, T., A. Katainen, K. Kaustell, E. Manninen, M. Norring, and H. Saloniemi (2001). **The use of an automatic concentrate feeding station in a loose housing system for dairy cattle. Part 2: The relationship between disturbance at the feeding station and the supply of concentrates and the milk production of dairy cow.** [Vakirehuautomaatin kaytto lypsylehmilla pihattonavetassa. Osa 2: Vakirehuautomaatilla tapahtuvan hairinnan suhde lehman vakirehun saantiin ja maidontuotantoon.] *Suomen Elainlaakarilehti* 107 (12): 701-705, ISSN: 0039-5501.

NAL Call No.: 41.8 F49

Keywords: automatic feed dispensers, concentrates, cow housing, cows, dairy cows, feed intake, feeding behavior, loose housing, milk yield, stress, stress response, Finnish language.

Kashiwamura, F., J. Suda, K. Furumura, S. Hidaka, T. Seo, and T. Iketaki (2001). **Habituation training for dairy cattle to milking boxes of new installed automatic milking system.** *Animal Science Journal* 72 (8): J266-J273, ISSN: 1344-3941.

NAL Call No.: SF1 A542

Keywords: cows, Holstein, breed, training of cows to enter milking boxes, automatic milking system, conventional stanchion stall barn, free stall barn, entrance gate, alley, three tandem milking boxes, parameters observed, duration of passing through the entrance gate, duration from passing the gate to entering into a milking box, score of training difficulty, number of trainings required for the cows to enter the milking box without difficulty.

Keil, N.M., L. Audige, and W. Langhans (2001). **Is intersucking in dairy cows the continuation of a habit developed in early life?** *Journal of Dairy Science* 84 (1): 140-146, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: Intersucking, i.e., cattle sucking the udder of heifers or cows, is a frequent problem in dairy herds and may lead to udder damage, mastitis, milk loss, and culling of breeding animals. Using epidemiological methods, we conducted an observational cross-sectional study to investigate risk factors for intersucking in Swiss dairy cows. We asked 114 randomly selected dairy farmers about a broad spectrum of environmental factors possibly associated with intersucking, such as housing conditions, management, and feeding of calves, heifers, and cows. Thirty of the 114 farms were confronted with intersucking in cows. The mean proportion of intersucking cows per farm was 1.6%. From a total of 3077 cows (Swiss Brown Cattle, Simmental, and Holstein Friesian) we recorded 49 cows that had performed or were currently intersucking. In 69% of these cows, intersucking had been observed as heifers. Using path analysis and multivariable stepwise backward logistic and linear regression analyses, we revealed that the most important risk factor for intersucking cows was the presence of intersucking heifers on a farm (odds ratio = 7.8). The results suggest that intersucking in cows is the continuation of a habit that was already established in a cow's subadult life. This emphasizes the importance of looking not only at the animal's current environmental situation but also considering its entire life history for the prevention of behavioral problems.

Keywords: dairy cows, Swiss Brown Cattle, Simmental, Holstein Friesian, breeds, abnormal behavior, intersucking, udder damage, mastitis, milk loss, cow housing, calf feeding, calves, livestock numbers, dairy herds, Switzerland.

Keil, N.M., and W. Langhans (2001). **The development of intersucking in dairy calves around weaning.** *Applied Animal Behaviour Science* 72 (24): 295-308, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy calves, intersucking, udder health problems, occurrence prior to weaning and thereafter, feeding management during weaning, food ration analysis, feeding management.

Ketelaar-de Lauwere, C.C., A.H. Ipema, E.N.J. van Ouwkerk, M.M. Hendriks, J.H.M. Metz, J.P. Noordhuizen, and W.G. Schouten (1999). **Voluntary automatic milking in combination with grazing of dairy cows: Milking frequency and effects on behaviour.** *Applied Animal Behaviour Science* 64(2): 91-109, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cattle, breed, Holstein-Friesian, cow, automatic milking system, farm equipment, voluntary automatic milking method, robots, grazing, feeding behavior, resting behavior, pastures, milking, frequency.

Kisac, P., J. Broucek, S. Mihina, M. Uhrincat, C.W. Arave, T.H. Friend, A. Hanus, and S. Marencak (2001). **Effects of rearing methods of heifers prior to weaning on subsequent behavior.** *Advances in Ethology* (36): 192-193, ISSN: 0931-4202.

NAL Call No.: 410 Z35B

Keywords: dairy calves, heifers, Holstein, breed, maze test, analytical method, housing, play behavior, rearing, weaning.

Kjaestad, H.P., and H.J. Myren (2001). **Cubicle refusal in Norwegian dairy herds.** *Acta Veterinaria Scandinavica* 42 (1): 181-187, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: dairy herds, heifers, behavior, housing, cubicles, litter, slatted floor pens, livestock numbers, surveys, Norway.

Kjaestad, H.P., and H.J. Myren (2001). **Failure to use cubicles and concentrate dispenser by heifers after transfer from rearing accommodation to milking herd.** *Acta Veterinaria Scandinavica* 42(1): 171-180, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87.

Keywords: dairy heifers, age, animal behavior, housing, cubicles, feed dispensers, livestock numbers, surveys, Norway.

Krohn C.C. (2001). **Effects of different suckling systems on milk production, udder health, reproduction, calf growth and some behavioural aspects in high producing dairy cows: a review.** *Applied Animal Behaviour Science* 72(3): 271-280, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, calves, different suckling systems, industrial countries, milk production, udder health, reproduction, behavior, gain, health, suckling systems, long term suckling, short term suckling, colostrum period, restricted versus free suckling systems, suckling decreases the risk of mastitis, post partum interval.

Krohn, C.C. (1994). **Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments. III. Grooming, exploration and abnormal behaviour.** *Applied Animal Behaviour Science* 42(2): 73-86.

NAL Call No.: QL750 A6

Keywords: environment, grooming, loose housing, tethered housing, exercise, exploration, abnormal behavior, extensive livestock farming.

Krohn, C.C. and L. Munksgaard (1993). **Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments II. Lying and lying-down behaviour.** *Applied Animal Behaviour Science* 37(1): 1-16, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Keywords: intensive environments, lying behavior, stalls, behavior, activity, auditory system, parental behavior.

LangRee, R. (1998). **The cow will let you know. [Kua gir beskjed.]** *Buskap* 50(1): 30-31.

NAL Call No.: 49 B96

Keywords: dairy cattle, animal behavior, animal welfare, health, cows.

Lanier, J.L., T. Grandin, R. Green, D. Avery, and K. McGee (2001). **A note on hair whorl position and cattle temperament in the auction ring.** *Applied Animal Behaviour Science* 73 (2): 93-101, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: Bos taurus beef breeds, Holstein dairy cattle, Bos indicus beef breeds, non Holstein dairy breeds, relationships between facial hair whorls and temperament in cattle, cattle auctions, temperament score, calm, agitated, Holsteins were calmer than beef cattle, management tool assessing temperament in novel environments.

Lefcourt, A.M., B. Erez, M.A. Varner, R. Barfield, and U. Tasch (1999). **A noninvasive radiotelemetry system to monitor heart rate for assessing stress responses of bovines.** *Journal of Dairy Science* 82(6): 1179-1187, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: A noninvasive radiotelemetry system was developed to monitor heart rates of cows and to view and analyze data. The system was validated by comparing heart rate data of two restrained heifers collected simultaneously using telemetric and direct electrocardiogram measurements and by acquiring data over 72h from two dry cows housed in an experimental handling facility consisting of a free-stall pen, a holding pen, a pass-through stall, and a second holding pen. Telemetric and direct measurements in response to pharmacological elevation of heart rates were essentially identical. For cows in the experimental facility, peristimulus-time histograms indexed to standing or lying showed that average heart rates for cows increased 4.0 +/- 1.4 beats/min after cows stood and decreased 4.8 +/- 1.0 beats/min after cows lay. Similarly, the average heart rate for the cow naive to the facility increased from 60 to 86 beats/min and remained elevated for 6.3 min when heart rate was indexed to maximal heart rate within +/- 3 min of entry into the pass-through stall. Heart rate for the naive cow increased consistently from around 60 to over 160 beats/min during repeated agonistic encounters between animals. Heart rate for the other cow was not affected by the encounters. These results show clearly that heart rate can be used to

monitor animal anxiety.

Keywords: dairy cows, heart rate, monitoring, telemetry, stress response, agonistic behavior, detection, animal welfare.

Lidfors, L.M. (1996). **Behavioural effects of separating the dairy calf immediately or 4 days post-partum.** *Applied Animal Behaviour Science* 49(3): 269-283, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Keywords: maternal-filial bond, separation, suckling behavior.

Lin, J.C., B.R. Moss, J.L. Koon, C.A. Flood, R.C. Smith, K.A. Cummins, and D.A. Coleman (1998).

**Comparison of various fan, sprinkler, and mister systems in reducing heat stress in dairy cows.**

*Applied Engineering in Agriculture* 14(2): 177-182, ISSN: 0883-8542.

NAL Call No.: S671.A66

Keywords: fans, heat stress, lactation performance, dairy cooling systems.

Loberg, J., and L. Lidfors (2001). **Effect of milkflow rate and presence of a floating nipple on abnormal sucking between dairy calves.** *Applied Animal Behaviour Science* 72 (3): 189-199, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, breed, Swedish Red and White, access to an artificial teat, open bucket, abnormal sucking, time drinking, treatments, bucket with fast flow, bucket with slow flow, floating nipple with fast flow and floating nipple with slow flow, behavioral observations.

Loberg, J. And L. Lidfors (2001). **Effect of stage of lactation and breed on dairy cows' acceptance of foster calves.** *Applied Animal Behaviour Science* 74 (2): 97-108, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: cows, calves, breed, Swedish Red and White, Swedish Holstein Friesian, fostering calves, cow acceptance, cows sniffing, behavior, cow aggressiveness towards calf, tied, loose housed.

Lupoli, B., B. Johansson, M.K. Uvnas, and S.K. Svennersten (2001). **Effect of suckling on the release of oxytocin, prolactin, cortisol, gastrin, cholecystokinin, somatostatin and insulin in dairy cows and their calves.** *Journal of Dairy Research* 68 (2): 175-187, ISSN: 0022-0299.

NAL Call No.: 44.8 J823

Keywords: cows, calves, Swedish Red and White, breed, types of early interaction between dairy cows and calves, influence milking/suckling related hormone release, machine milked, blood samples, plasma levels, oxytocin, prolactin, cortisol, gastrin, cholecystokinin (CCK), somatostatin insulin.

Margerison, J. K., Phillips, C. J. C., Preston, T. R. (1999). **The effect of cow-calf separation in dairy cattle on animal behaviour.** In: *Farm Animal Welfare - Who Writes the Rules? Proceedings of an International Symposium Organized by the British Society of Animal Science, Edinburgh, UK, 1999*, A.J.F. Russel, C.A. Morgan, C.J. Savory, M.C. Appleby, and T.L.J. Lawrence (eds.), British Society of Animal Science (No. 23): UK.

NAL Call No.: SF5 B74 no. 23

Keywords: animal behavior, dairy cattle, animal welfare, livestock, legislation, calves.

Millar, K.M. (2000). **Respect for animal autonomy in bioethical analysis: the case of Automatic Milking Systems (AMS).** *Journal of Agricultural and Environmental Ethics* 12 (1): 41-50, ISSN: 0893-4282.

NAL Call No.: BJ52.5 J68

Keywords: milking, cows, ethics, robots, animal welfare, behavioral freedom, motivation, automation, milking machines.

Mogensen, L., C.C. Krohn, and J. Foldager (1999). **Long-term effect of housing method during the first three months of life on human-animal relationship in female dairy cattle.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 49(3): 163-171, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: dairy cattle, housing, calves, cows, handling, lactation, milk, milk production, milking, pens, cattle housing, animal welfare, human-animal relationship.

Mogensen, L., Krohn, C.C., Sorensen, J.T., Hindhede, J., and L.H. Nielsen (1997). **Association between resting behaviour and live weight gain in dairy heifers housed in pens with different space allowance and floor type.** *Applied Animal Behaviour Science* 55(1/2): 11-19, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cattle, heifers, rest, behavior patterns, liveweight gain, cattle housing, floor pens, space requirements, floor space, floor type, slatted floors, litter, welfare.

Morita, S., M. Komiya, K. Izumi, K. Oikawa, and S. Hoshihara (2001). **Changes of the utilization of trough, stall and automatic milking machine after the transfer cows to automatic milking system.** *Journal of Rakuno Gakuen University, Natural Science* 26 (1): 57-61, ISSN: 0388-001X.

NAL Call No.: QH7.J68

Keywords: dairy cows, behavior, diurnal variation, automatic milking machines, housing, tie-stalls, free-stall, automatic milking trough use, Japanese language.

Morrow-Tesch, J. (Winter 1996/1997). **Environmental enrichment for dairy calves and pigs.** *Animal Welfare Information Center Newsletter* 7(3/4): 3-8, ISSN: 1050-561X.

NAL Call No.: aHV4701.A952

Keywords: calves, pigs, pens, toys, sucking, animal welfare, lymphocytes, blood plasma, hydrocortisone, animal behavior, fields, neurons, postnatal development.

Munksgaard, L., A.M.B. de Passille, J. Rushen, and J. Ladewig (1999). **Dairy cows' use of colour cues to discriminate between people.** *Applied Animal Behaviour Science* 65(1): 1-11, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: handling, color cues, human-animal interaction, people discrimination.

Munksgaard, L., A.M.B. de Passille, J. Rushen, K. Thodberg, and M.B. Jensen (1997). **Discrimination of people by dairy cows based on handling.** *Journal of Dairy Science* 80(6): 1106-1112, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: This study examined whether dairy cows could distinguish among people based on the treatment received, whether cows used color as a cue to make this discrimination, and whether cows generalized their discrimination to other locations. Twelve cows were each repeatedly treated in a special treatment stall by two people wearing red or yellow overalls. One person always treated the cows aversively, and the other always treated them gently. The distance between each person and each cow in the home stall and in the treatment stall was scored during tests. Before treatment, the distances that cows maintained from the two people were uncorrelated, and the distances that they maintained in the treatment stall were uncorrelated with those in the home stall. Before and after treatments, the cows stood further from the handlers in the treatment stall than in the home stall, regardless of color of the overalls. Defecation and urination were more frequent during aversive treatments. After treatment, the cows stood further from the aversive handler than from the gentle handler in both stalls, and distance from the aversive handler was positively correlated with distance from the gentle handler. The cows did not discriminate when the aversive and gentle handlers wore blue overalls (as worn by the usual barn handlers), when two unfamiliar people wore the same color overalls as the handlers, or when the cows were shown photographic slides of the two handlers. In conclusion, the cows learned to discriminate among the handlers, partially based on the color of the clothes worn. This discrimination was generalized to another location.

Keywords: cows, breed, Friesian, husbandry, animal welfare, stress, animal behavior, stockmen, color of clothes worn, discrimination, rough versus gentle handling, Denmark.

Munksgaard, L. and H.B. Simonsen (1996). **Behavioral and pituitary adrenal-axis responses of dairy cows to social isolation and deprivation of lying down.** *Journal of Animal Science* 74(4): 769-778, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: The behavior and plasma concentrations of ACTH and cortisol were studied in 30 Friesian cows kept in tie stalls and assigned to three treatments: control (C), deprivation of lying down from 0900 to 1600 and 2200 to 0500 (D), and social isolation (I). Behavior of the cows was observed before and after 4 and 8 wk of treatment. The D- and I-cows showed increased frequency of transitions between different behavioral activities ( $P < .05$ ). In D- and I-cows the frequency of grooming ( $P < .01$ ) and idling ( $P < .001$ ), and the amount of leaning ( $P < .001$ ) increased. In D-cows the frequency of eating was also increased. The behavior and cortisol response to two novel arena tests performed on two consecutive days after 22 d of treatment suggests that social isolation and deprivation of lying change cows' reactions to a novel environment. After 23 d of treatment, concentrations of ACTH and cortisol were measured during 7.5 h. On d 24, cortisol concentrations were determined at time -.5, 0, .5, 1, 2, 3, 4, and 5 h after i.v. administration of ACTH. Cortisol concentrations did not differ among treatment groups in the baseline series and after ACTH administration. In D-cows, ACTH concentration was increased in part of the baseline series ( $P < .05$ ). The results suggest that the socially isolated cows were frustrated or tried to compensate for a lack of stimulation and that repeated deprivation of lying down is aversive to cows. Keywords: dairy cows, behavior, corticotropin, hydrocortisone, animal welfare, blood plasma, stress factors, deprivation.

Nielsen, L.H., L. Mogensen, C. Krohn, J. Hindhede, and J.T. Sorensen (1997). **Resting and social behaviour of dairy heifers housed in slatted floor pens with different sized bedded lying areas.** *Applied Animal Behaviour Science* 54(4): 307-316, ISSN: 0168-1591.

NAL Call No.: QL750.A6.

Keywords: social behavior, slatted floor, pens, area, resting.

Ohnstad, I. (1998). **Machine milking and the well-being of the dairy cow.** In: *British Mastitis Conference 1998*, Axient Information Services: Crewe, UK, p.62-67.

Keywords: cows, dairy cows, machine milking, animal welfare, animal behavior, milking machines, milking, milking parlors, dairy farming, United Kingdom.

Olofsson, J., and H. Wiktorsson (2001). **Competition for total mixed diets fed restrictively using one or four cows per feeding station.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(1): 59-70, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: cows, housing, feeding stations, computerized feeding, feed intake, feeding behaviour, social dominance, aggression, video recordings, Sweden.

Osterman, S., and I. Redbo (2001). **Effects of milking frequency on lying down and getting up behaviour in dairy cows.** *Applied Animal Behaviour Science* 70 (3): 167-176, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, animal behavior, lying down behavior, getting up behavior, standing behavior duration, milking interval, rumination, animal welfare.

Paranhos da Costa, M.J.R. and D.M. Broom. (2001). **Consistency of side choice in the milking parlour by Holstein-Friesian cows and its relationship with their reactivity and milk yield.** *Applied Animal Behaviour Science* 70 (3): 177-186, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, Holstein-Friesian, breed, behavior, temperament, milking, milking parlors, milk yield, animal welfare, milking side preferences.

Perrey, A., G. Rehkamper, C.W. Werner, and A. Gorlach (2001). **Influence of housing-systems in arousal behaviour by cattle bulls towards a human.[Der Einfluss der Haltungsform auf das Erregungsverhalten von erwachsenen Milchrinderbullen gegenüber dem Menschen.]** *KTBL-Schrift* 403: 71-80.

NAL Call No.: 18 K96

Keywords: bulls, Holstein Friesian, Red Holstein, breed, behavior, human animal interaction, aggressive

behaviors, presenting body; pulling mouth to a bow, pawing with forelegs, rubbing head on the ground, snorting, bellowing, poking tongue, housing, German language.

Phillips, C.J.C. and I.D. Morris (2002). **The ability of cattle to distinguish between, and their preference for, floors with different levels of friction, and their avoidance of floors contaminated with excreta.**

*Animal Welfare* 11(1): 21-29, ISSN: 0962-7286.

NAL Call No.: HV4701.A557

Keywords: dairy cows, behavior, training, food reward, flooring type, discrimination, preferences, smooth epoxy resin surface, surface-applied bauxite aggregates, floors covered in excreta, static friction, walking.

Phillips, C.J.C. and I.D. Morris (2001). **A novel operant conditioning test to determine whether dairy cows dislike passageways that are dark or covered with excreta.**

*Animal Welfare* 10(1): 65-72, ISSN: 0962-7286.

NAL Call No.: HV4701.A557

Keywords: dairy cows, conditioning, stimuli, molasses, learning ability, cattle slurry, floors, lighting, animal welfare, preferences.

Phillips, C.J.C., and M.I. Rind (2001). **The effects on production and behavior of mixing uniparous and multiparous cows.**

*Journal of Dairy Science* 84(11): 2424-2429, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, mixed versus unmixed groups, aggressive behavior, feeding behavior, grazing behavior, dairy performance, milk yield.

Plusquellec, P. and M.F. Bouissou Marie France (2001). **Behavioural characteristics of two dairy breeds of cows selected (Herens) or not (Brune des alpes) for fighting and dominance ability.**

*Applied Animal Behaviour Science* 72 (1): 1- 21, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: Herens, Brune des alpes, breeds, fighting and dominance ability, behavioral trait, social behavior, dominance, agonistic behavior, social tolerance, social motivation, social distance, fear reactions, ease of handling, physiological correlates, social distances at pasture, ease of handling.

Prescott, N.B., T.T. Mottram, and A.J.F. Webster (1998). **Effect of food type and location on the attendance to an automatic milking system by dairy cows and the effect of feeding during milking on their behaviour and milking characteristics.**

*Animal Science: An International Journal of Fundamental and Applied Research* 67(2): 183-193, ISSN: 1357-7298.

NAL Call No.: SF1 A56

Keywords: automatic milking systems, behavior, feeding, concentrates, milking parlors, milking rate, milk flow, milk yield, milking interval.

Prescott, N.B., T.T. Mottram, and A.J.F. Webster (1998). **Relative motivations of dairy cows to be milked or fed in a Y-maze and an automatic milking system.**

*Applied Animal Behaviour Science* 57(1): 23-33, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: motivation, Y-maze, choice tests, automatic milking.

Purushottam, S. and S. Kiran (2002). **Shelter seeking behaviour of dairy cattle in various types of housing systems.**

*Indian Journal of Animal Sciences* 72(1): 91-95, ISSN: 0367-8318.

NAL Call No.: 41.8 IN22

Keywords: crossbred, lactating cows, shelter system, shelter seeking behavior, loose housing, loose housing with central shed, closed housing, tree-shade, summer, rainy season, winter season.

Redbo, I., M. Emanuelson, K. Lunberg, N. Oredsson (April 1996). **Feeding level and oral stereotypies in dairy cows.**

*Animal Science: An International Journal of Fundamental and Applied Research* 62(2): 199-206, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: dairy cows, lactation stage, unrestricted feeding, Swedish Red-and-White, restricted feeding, abnormal behavior, rumination, eating, feed intake, physical activity, posture, animal welfare, complete feeds, plane of nutrition.

Rehkamper, G. and A. Gorlach (1997). **Visual discrimination in adult dairy bulls.** *Journal of Dairy Science* 80(8): 1613-1621, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy bulls, Holstein-Friesian, learning ability, temperament, training of animals.

Roberts, J. (1997). **Understanding cow behavior.** *Bovine Practitioner* 31(2): 104-107, ISSN: 0524-1685.

NAL Call No.: SF779.5 A1B6

Keywords: cows, behavior, stress, animal welfare, milk production, stray voltage, diagnosis, milking.

Rook, A.J. and C.A. Huckle (1997). **Activity bout criteria for grazing dairy cows.** *Applied Animal Behaviour Science* 54(2): 89-96, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: behavior, grazing, bout criteria, feeding, nutrition.

Rushen, J., A. Boissy, E.M.C. Terkuiuw, and A.M.B. de Passille (1999). **Opioid peptides and behavioral and physiological responses of dairy cows to social isolation in unfamiliar surroundings.** *Journal of Animal Science* 77(11): 2918-2924, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: To test whether endogenous opioid peptides are involved in the behavioral and physiological responses of cattle to stress, 12 Holstein cows were either placed in social isolation in unfamiliar surroundings for 15 min or remained in their home stalls, either with or without naloxone treatment, following a Latin square design. Vocalizations (judged as high or low frequency), defecation/urination, and heart rate were recorded, latency to respond to local thermal stimulation of the leg by means of a laser was measured to detect pain sensitivity, and blood was sampled and assayed for cortisol concentrations. Naloxone in the home stall increased cortisol concentrations and tended to reduce response latencies to the laser but did not induce vocalization. Social isolation increased the incidence of high-frequency vocalization and of defecation/urination, heart rate, cortisol concentrations, and response latencies to the laser. Prior administration of naloxone increased the incidence of low-frequency vocalization in isolation, but it had no effect on heart rate or on responses to the laser and only limited effect on cortisol concentrations when the cows were isolated. Brief periods of social isolation in unfamiliar surroundings seem to be stressful to cows, as indicated by increased heart rate, hypothalamic-pituitary-adrenocortical axis activity, and vocalization. Isolation also reduces pain sensitivity, suggesting a stress-induced analgesia. However, we found no evidence that naloxone-sensitive opioid receptors were involved in these responses.

Keywords: dairy cows, behavior, physiology, housing, stress, hydrocortisone, blood chemistry, naloxone, opioid peptides, heart rate, animal welfare, social interaction, vocalization.

Rushen, J., A.M.B. de Passille, and L. Munksgaard (1999). **Fear of people by cows and effects on milk yield, behavior, and heart rate at milking.** *Journal of Dairy Science* 82(4): 720-727, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: To examine the ability of cows to recognize people and the effects of the fear of people by cows at milking, cows (n = 14) were handled by two people; one handled the cows gently, and the other handled them aversively. The handlers wore clothes of different color. After handling, the cows stood further from the aversive handler than from the gentle handler. When the handlers changed the color of their clothing, the cows did not discriminate between them. The gentle handler stood close to the cows for one milking, and the aversive handler stood close to the cows for another milking. For two control milkings, neither handler was present. Measurements included milking duration, milk yield, residual milk, heart rates, incidence of movement, and kicking behavior of the cows. Compared with control milkings, the presence of the gentle handler did not change milk yield or residual milk. The presence of the aversive handler increased residual milk by 70%. Kicking behavior of cows during milking was

reduced with either handler present, and kicking during udder preparation was reduced with the aversive handler present. For cows that best discriminated between the handlers, the presence of the aversive handler increased movement and heart rate during milking. For cows that did not discriminate well between the handlers, the presence of either handler increased heart rate and decreased movement during milking. Cows recognized individual people, and the fear of people who are present during milking may reduce milk yield.

Keywords: handling, fear, heart rate, kicking behavior, milk yield, milking.

Rushen, J., L. Munksgaard, A.M.B de Passille, M.B. Jensen, and K. Thodberg (1998). **Location of handling and dairy cows: responses to people.** *Applied Animal Behaviour Science* 55(3/4): 259-267, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, handling, stockmen, learned aversion, fear, animal behavior, cow temperament, animal welfare, husbandry.

Rushen, J. and A.M.B de Passille (1996). **Behaviour, welfare and productivity of dairy cattle.** In: *Proceedings of the Lennoxville Conference on Milk Production, Bishop's University, Lennoxville, Quebec, Canada, October 9, 1996*, Vol.78, p. 3-21, Centre de recherche et de developpement sur le bovin laitier et le porc, Agriculture et Agroalimentaire Canada: Lennoxville, Quebec, Canada.

Keywords: animal welfare, stress, abnormal behavior, dairy cattle, animal behavior, productivity, cows, dairy cows, reviews, husbandry, calves, cattle housing.

Schrader, L. (2001). **The behaviour of farm animals and its significance for housing design.** In: *Human-animal relationship: stockmanship and housing in organic livestock systems. Proceedings of the Third NAHWOA Workshop, Clermont-Ferrand, France, 21-24 October 2000*, M. Hovi and M. Bouilhol (eds.), Network for Animal Health and Welfare in Organic Agriculture, University of Reading: Reading, UK, ISBN: 0-7049-1094-2, p. 54-63

Keywords: cattle, livestock, abnormal behavior, animal behavior, animal housing, organic farming.

Schrader, L. (2001). **Identification of individual behavioural characteristics in dairy cows. [Identifizierung individueller Verhaltenscharakteristika bei Milchkuhen.]** *KTBL-Schrift* 403: 18-27.

NAL Call No.: 18 K96

Keywords: dairy cows, behavior, stress, salivary cortisol levels, individual variation, husbandry, German language.

Schrader, L., S. Meier, C. Blank, and D. Fuger (2000). **Personality traits and stress responsiveness in dairy cows. ["Persönlichkeit" und Stress bei Milchkuhen.]** *Agrarforschung* 7(1): 20-23, ISSN: 1022-663X.

NAL Call No.: S469.S9A37

Keywords: dairy cows, stress, farmers, questionnaires, cow's personality traits, individual differences, animal behavior, behavioral tests, German language.

Senica, M., I. Stuhec, and V. Rezar (2001). **Ethological principles in dairy cattle farming. [Reja krav molznic po etoloskih nacelih.]** *Zootehnika* 78 (1): 43-56, ISSN: 1408-3434.

Keywords: dairy cows, Brown, Simmental, breeds, housing, tie stalls, stables, pasture, behavior, lying, defecating, urinating, grooming, chewing, drinking, resting, Slovenian language.

Sisto, A.M. and T.H. Friend (2001). **The effect of confinement on motivation to exercise in young dairy calves.** *Applied Animal Behaviour Science* 73(2): 83-91, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, exercise, motivation, animal behavior, locomotion, calf housing, individual versus group pens, pens, group effect, duration, hydrocortisone, blood plasma, lymphocytes, leukocyte count.

Stefanowska, J., M. Plavsic, A.H. Ipema, and M.M.W.B. Hendriks (2000). **The effect of omitted milking on the behaviour of cows in the context of cluster attachment failure during automatic milking.** *Applied Animal Behaviour Science* 67(4): 277-291, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Abstract: The objective was to evaluate the effects of individual housing design (stalls vs pens) with widths of 56, 66, and 76 cm (2 X 3 factorial treatment arrangement) on growth, hematology, cleanliness, ambulation, abomasal hairball, and carcass measurements. Three groups of 36 Holstein bull calves (n = 108) were randomly allotted within group to treatments. There were no effects ( $P > .05$ ) of housing design, width, or two-way interactions for BW, ADG, carcass weight, or dressing percentage. Blood samples were collected at approximately 33-d intervals. Mean values for hemoglobin, hematocrit, white blood cell count (WBC), and red blood cell count (RBC) were not different among treatments ( $P > .05$ ), with the exception of d 28 hemoglobin, which was greater in the calves housed in 66-cm vs 76-cm stall. There were differences ( $P < .05$ ) due to design and design X width effects for hindquarter cleanliness; manure accumulation tended to be greater in pens vs stalls as width increased. There were increases ( $P < .05$ ) in left front knee swelling scores as stall or pen size decreased; no important differences were observed in ambulatory ability among treatment groups. There were design effects ( $P < .05$ ) for excitability scores, with calves in stalls being more excitable. There were no important treatment effects ( $P > .05$ ) for liver, spleen, and lung condition, number of abomasal hairballs, or 0- and 24-h after slaughter flank or brisket color. These results indicate that housing designs and widths did not affect veal calf growth performance, WBC, RBC, hemoglobin, hematocrit, ambulation, or muscle color.  
Keywords: dairy cows, milking interval, milking parlors, automatic control, failure, clusters, animal behavior, posture, eating, resting, drinking, urination, defecation, milk yield, lactation number, social dominance, animal welfare.

Stefanowska, J., A.H. Ipema, and M.M.W.B. Hendriks (1999). **The behaviour of dairy cows in an automatic milking system where selection for milking takes place in the milking stalls.** *Applied Animal Behaviour Science* 62(2/3): 99-114, ISSN: 0168-159.

NAL Call No.: QL750.A6

Keywords: dairy cows, milking, automation, milking interval, robots, automatic control, movement, duration, defecation, urination, social dominance, efficiency.

Stefanowska, J., N.S. Tiliopoulos, A.H. Ipema, and M.M.W.B. Hendriks (1999). **Dairy cow interactions with an automatic milking system starting with "walk-through" selection.** *Applied Animal Behaviour Science* 63(3): 177-193, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, milking parlors, milking interval, automation, behavior, gates, gait, duration, automatic feed dispensers, concentrates, urination, defecation, animal welfare, efficiency.

Steinhardt, M., and H.H. Thielscher (1999). **Response of animals to familiar and unfamiliar situations. Transport and temporary separation of suckled calves from the herd at different ages during rearing. Effect of playing recordings of maternal vocalization on hormones, heart rate and vocal responses. [Reaktionsmuster von Tieren auf gewohnte und ungewohnte Ereignisse. Transport und temporäre Separation von Saugkalbern aus der Mutterkuhhaltung in verschiedenen Altersperioden während der frühen Aufzuchtperiode sowie Effekte der Präsentation von Muttertierufen auf hormonelle Variablen, Herzfrequenz und Lautausserungen der Tiere.]** *Landbauforschung Volkenrode* 49(3): 153-166, ISSN: 0458-6859.

NAL Call No.: 18 L2353

Keywords: cows, dams, heart, heart rate, young animals, vocalization, animal welfare, calves, body temperature, hydrocortisone, stress, German language.

Steinhardt, M. and H.H. Thielscher (1999). **Species specific husbandry and physiological functions of animals. Development quality and adaptation of group reared dairy calves at specific age periods and seasonal effects by birth periods and rearing conditions. [Tiergerechte Haltung und physiologische Funktionen von Tieren. Entwicklungsqualität und Anpassungsreaktionen von am Trankeautomaten aufgezogenen Milchrindkalbern in spezifischen Altersperioden sowie jahreszeitliche Effekte durch Geburtsperioden und Aufzuchtbedingungen.]** *Animal Feed Science and Technology* 49(3): 136-152, ISSN: 0377-8401.

NAL Call No.: SF95.A55

Keywords: calves, calf rearing, husbandry, animal welfare, behavior, adaptation, hydrocortisone, diagnosis, heart rate, hemoglobin, postnatal development, German language.

Steinwigger, A., B.M. Ehm, E. Zeiler, L. Gruber, and F. Lettner (2001). **Effect of day or night grazing on forage intake and grazing behaviour of dairy cows.** [Einfluss von tag oder nachtweidehaltung auf Futteraufnahme und Fressverhalten von Milchkuhen.] *Zuchtungskunde* 73 (3): 215-232, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: cows, grazing conditions, feed intake, grazing behavior, during day and night, fresh forage, fed in the stable, energy concentration, total feed, protein intake, nutrient supply, climatic conditions.

Szyndler, J. and A. Kaczor (1997). **Behaviour of dairy cows in litter and litter-free tie-in stalls of different size.** [Zachowanie się krow mlecznych na wiazanych stanowiskach sciolowych i bezsciolowych o roznych wymiarach.] *Roczniki Naukowe Zootechniki* 24(4): 249-262, ISSN: 0137-1657.

NAL Call No.: SF1.R6

Keywords: cattle housing, litter, litter-free tie-in stalls, stall dimensions, on the, cleanliness, skin injuries and abrasions, legs, udder, health, behavior, lying, standing, animal welfare, Poland, Polish language.

Thomas, T., D.M. Weary, and M.C. Appleby (2001). **Newborn and 5-week-old calves vocalize in response to milk deprivation.** *Applied Animal Behaviour Science* 74(3): 165-173, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, newborn animals, calf feeding, milk, deprivation, supplementary feeding, vocalization, individual characteristics, weaning, age differences, animal welfare.

Uetake, K. (1999). **Study on cognitive and learning abilities of dairy cattle and their application for herd management.** *Research Bulletin of the Hokkaido National Agricultural Experiment Station* 170: 9-43.

Keywords: cow housing, cattle housing, dairy cattle, cows, reviews, animal behavior, animal welfare, cognitive development, learning, productivity, farm management, milking, automation, robots, color, hearing, feeding behavior, electric current, music, design, East Asia, Japanese language.

Uetake, K., K. Yayou, and T. Okamoto (1998). **Influence of feeding operation and social factors on cattle locomotion in free stall barns.** *Canadian Journal of Animal Science* 78(3): 421-424, ISSN: 0008-3984.

NAL Call No.: 41.8 C163

Abstract: The influence of feeding operation and social factors on voluntary movement of cattle was studied with a group of nine Holstein calves in free stall barns. The results of this study suggest that cattle can move more voluntarily when rations are put beyond the place that farmers want them to walk through. The results also suggest that conflicts between motivations for approaching rations and avoiding competitive feeding behaviour should be considered when efficient systems of locomotion control of cattle groups are designed, such as in AMSs.

Keywords: dairy cattle, calves, feeding behavior, social behavior, motivation, social factors, locomotion, free stall, barns, housing.

Uetake, K., J.F. Hurnik, and L. Johnson (1997). **Effect of music on voluntary approach of dairy cows to an automatic milking system.** *Applied Animal Behaviour Science* 53(3): 175-182, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Keywords: music, automatic milking, approach behavior.

Uetake, K., J.F. Hurnik, and L. Johnson (1997). **Behavioral pattern of dairy cows milked in a two-stall automatic milking system with a holding area.** *Journal of Animal Science* 75(4): 954-958, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: Behavioral pattern was investigated in dairy cows milked in an automatic milking system (AMS) in contrast to cows milked in a conventional milking parlor. Forty-eight Holstein cows were allocated to two groups of 24 animals. The two groups were housed in adjacent free stall pens. Both

groups were milked twice a day at 0500 and at 1500 for 30 d before commencement of the experiment, one in a two-stall AMS (AMS Group), the other in a 16-stall herringbone parlor (Parlor Group). The respective holding areas were used to encourage cows to enter the milking compartments. All cows consumed total mixed rations ad libitum, provided once a day between 0500 and 0600 in indoor feed bunks. Cows in both groups were allowed daily access to two adjacent outdoor paddocks from 1030 to 1230. Behavioral observations were carried out in the free stall barn from 0400 to 0900 and from 1250 to 1900 for 30d. The number of cows lying down, standing in the stalls, standing in the passageway, and eating was recorded every 10 min. Analyses of variance were used to compare time serial changes in behavioral states between groups. Although the time serial changes in the behavioral states were not different between groups after returning from paddocks, they became significantly different between groups for all four recorded behavioral states after the onset of milking. Ethograms during the 11-h observation period showed that cows in the AMS group spent less time eating at the feed bunk and standing in the stalls to compensate for the longer time standing in the holding area. The results indicate that AMS milking with a holding area affects social synchronization of cows eating and resting and reduces time spent eating.

Keywords: automation, milking machines, milking parlors, behavior, milk yield, lactation stage, age, posture, eating, duration, activity sampling.

Vaarst, M., M.B. Jensen, and A.M. Sandager (2001). **Behaviour of calves at introduction to nurse cows after the colostrum period.** *Applied Animal Behaviour Science* 73(1): 27-33, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, housing, single boxes, teat bucket, cow colostrum, behavior, abnormal behavior, social behavior, feeding, nurse cows, suckling.

Vaarst, M., J. Hindhede, and C. Enevoldsen (1998). **Sole disorders in conventionally managed and organic dairy herds using different housing systems.** *Journal of Dairy Research* 65(2): 175-186, ISSN: 0022-0299.

NAL Call No.: 44.8 J823

Abstract: Records of claw trimmings were analysed in seven organic and six conventional Danish herds (a total of 974 cows). The housing systems represented were tie stall systems, loose housing system with slatted floor (one organic herd), and deep litter systems (deep straw bedding). Occurrence of sole disorders was analysed separately for cows in first lactation and for cows in later lactations. Three different responses (acute haemorrhage, sole ulcer in one leg and sole ulcer in two or more legs) were analysed using three binomial logistic regression analyses for each group. Herd analysed as a fixed effect was a strong risk factor for all kinds of sole ulcer. Lactation stage was a risk factor for acute haemorrhage in both groups of cows, and for sole ulcer in first parity cows. In general, there was a strong positive association between the period 61-120 d post partum and the presence of sole disorders. Breed was associated with acute haemorrhage in cows in second and later parities, and sole ulcer in one leg only in first parity cows in an interaction with lactation stage in both conditions. Danish Friesian cows were strongly associated with sole disorder, although the combination of lactation stage from 61 to 120 d post partum in cows of other dual-purpose breeds was positively associated with the presence of sole ulcer in one leg only in first parity cows. The time of year for claw trimming was a risk factor for acute haemorrhage in first parity cows, with the period from December to January most strongly associated with acute haemorrhage. Previous disease treatment was a risk factor for sole ulcer in two or more legs in second and later parities. Udder related disorders and disorders other than reproductive problems were positively associated with the occurrence of sole ulcer. Body weight at calving was associated with acute haemorrhage in cows in second and subsequent parities. Body weight lower than the mean herd level by > 50 kg was negatively associated with acute haemorrhage.

Keywords: dairy herds, housing, lameness, handling, feet, lesions, hemorrhage, lactation stage, breed differences, Friesian, body weight, lameness, deep litter housing, stalls, hooves, organic farming, slatted floors, straw, litter, calving season, Denmark.

Vdovina, N.V., and D.I. Lyapolov (2001). **About research of domestication behavior of calves.**

*Sel'Skokhozyaistvennaya Biologiya* 2: 107-110, ISSN: 0131-6397.

NAL Call No.: S13.S44

Keywords: domestication, behavior of calves, human animal relationships, lack of fear, food reactions, distance of unknown man, adaptability, Russian language.

Veissier, I., A. Boissy, J. Capdeville, and C. Sarignac (2000). **Welfare of livestock: how to define and evaluate? [Le bien-etre des animaux d'elevage: comment peut-on le definir et l'evaluer?]**

*Developmental Medicine and Child Neurology* 31(205): 117-124, ISSN: 0012-1622.

Keywords: livestock, animal welfare, evaluation, stress, behavior, environment, health, French language.

Veissier, I., P. Chazal, P. Pradel, and P. Le Neindre (1997). **Providing social contacts and objects for nibbling moderates reactivity and oral behaviors in veal calves.** *Journal of Animal Science* 75(2): 356-365, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: The aim of this work was to assess the role of social and physical enrichment in the adaptation of veal calves to their environment. We compared calves housed in individual stalls that varied in the extent of contacts they allowed between neighbors (16 calves: open partitions; 16 calves: solid partitions; 32 calves: solid and extended partitions preventing all contact). All but 16 out of the 32 isolated calves were provided with a piece of tire and a chain, objects they could easily nibble. We assessed time budget, behavioral reactions to a water throw, neuroendocrine responses to stress (ACTH challenge and catecholamine synthesis), health, and growth. Calves kept in isolation displayed more startled reactions (16 isolated calves vs 5 non-isolated calves were startled by the throw,  $P < .05$ ). Calves without objects spent more time nibbling at the feeding grille (5 vs 3% time,  $P < .01$ ), licking their lips and tongue-rolling (7 vs 4% time,  $P < .05$ ). Social contacts and the provision of objects had no incidence on neuroendocrine measurements and growth. Contacts with neighbors resulted in a slight but nonsignificant rise in disease. Depriving calves of social contacts increases behavioral reactivity, probably because there are no peer animals through which reactions can be moderated, and the lack of adequate objects to nibble promotes self-directed activities.

Keywords: calves, behavior, neurohormones, stress, veal, calf housing, stalls, group size, animal welfare, partitions, enrichment, toys, grooming, fright, behavior, rest, blood plasma, hydrocortisone, stress response, breed differences, Holstein-Friesian, Montbeliard, health, lesions, stomach ulcers, scars, nibbling, sniffing, lip-licking, tongue-rolling.

Veissier, I., V. Gesmier, P. Le Neindre, J.Y. Gautier, and G. Bertrand (1994). **The effects of rearing in individual crates on subsequent social behaviour of veal calves.** *Applied Animal Behaviour Science* 41(3/4): 199-210, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: veal calves, social behavior, housing, isolation rearing, crates.

Waiblinger, S., T. Baars, and C. Menke (2001). **Understanding the cow: the central role of human animal relationship in keeping horned dairy cows in loose housing.** In: *Human Animal Relationship: Stockmanship and Housing in Organic Livestock Systems. Proceedings of the Third NAHWOA Workshop, Clermont-ferrand, France, 21-24 October 2000*, M. Hovi and M. Bouilhol (eds.), p. 64-78, Network for Animal Health and Welfare in Organic Agriculture, University of Reading: Reading, UK, ISBN: 0-7049-1094-2.

Keywords: animal behavior, animal welfare, cattle housing, cows, dairy cows, loose housing, organic farming, stockmen.

Weary, D.M., and B. Chua (2000). **Effects of early separation on the dairy cow and calf. 1. Separation at 6 h, 1 day and 4 days after birth.** *Applied Animal Behaviour Science* 69(3): 177-188, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, dairy cows, animal behavior, physical activity, vocalization, calf removal, responses, age differences, animal welfare.

Wenzel, C. (2001). **Initial ethological improvements for the management of cows milked by an automatic milking system. [Erste ethologische Empfehlungen zum Management von Milchrindern beim**

**Melken in einem automatischen Melksystem.] *Tierärztliche Umschau* 56 (1): 21-24, ISSN: 0049-3864.**

NAL Call No.: 41.8 T445

Keywords: dairy cows, automation, milking, robots, management, milking parlors, stress, adaptation, animal welfare, milkers, milking robots, human animal relationships, German language.

Wilson, L.L., T.L. Terosky, C.L. Stull, and W.R. Stricklin (1999). **Effects of individual housing design and size on behavior and stress indicators of special-fed Holstein veal calves.** *Journal of Animal Science*

77(6): 1341-1347, ISSN: 0021-8812.

NAL Call No.: 49 J82.

Abstract: The objectives of this study were to determine effects of housing design (calves tethered in open stalls vs untethered in individual pens) and widths of 56, 66, and 76 cm (2 x 3 factorial arrangement of treatments) on indicators of stress and behavior in special-fed veal calves. Three production cycles (groups) were used, each with 36 Holstein bull calves. Calves (n = 108) were randomly allotted to treatments upon arrival at the facility. Blood samples were collected four times (wk 4, 9, 13, and 18) during the 18-wk production cycle. Blood serum values for cortisol and (alpha1)-acid glycoprotein (AGP) exhibited few treatment differences. Blood leukocyte differential counts at 4 and 18 wk (segmented neutrophils [N], banded neutrophils, lymphocytes [L], basophils, and the N:L ratio) were not different ( $P > .05$ ) among housing designs or widths. However, there were differences ( $P < .05$ ) in monocytes and eosinophils during the 28-d period after arrival; calves in stalls 76 cm wide had the greatest percentage of both leukocytes, and calves in the 66-cm stalls had the lowest monocyte percentage. Calves were recorded on videotape during wk 4, 13.5, and 18 to determine frequencies and durations of postures and behaviors (e.g., lying, standing, chewing, tongue playing, grooming, and investigative activities). There were no consistent differences ( $P > .05$ ) in postures or behaviors among calves in different housing designs or widths. Calves spent approximately 71 and 31% in lying and standing positions, with no preference for the right or left side while recumbent. There was a tendency for calves in wider stalls or pens at wk 9 and 18 to exhibit more self-grooming activities. Tongue playing and investigative and chewing activities were exhibited in all treatments, but no differences ( $P > .05$ ) were observed. However, calves housed in the 56-cm pens displayed difficulty in changing from lying to a standing position and were unable to extend one or more legs while recumbent. Even though there were few differences in behavioral, physiological, growth, or anatomical traits in this study, further increases in age and(or) weight of finished calves will require a reassessment of the appropriateness of individual veal calf housing design and dimensions.

Keywords: calves, young animals, Holstein, stress, veal calves, basophils, blood serum, hydrocortisone, eosinophils, glycoproteins, grooming, leukocytes, monocytes, neutrophils, tethered housing, cattle housing, animal welfare, animal experiments, hematology, blood chemistry, calf housing, stalls, pens, cubicles.

Winter, A. and J.E. Hillerton (1995). **Behaviour associated with feeding and milking of early lactation cows housed in an experimental automatic milking system.** *Applied Animal Behaviour Science* 46(1/2): 1-

15, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Abstract: The successful integration of automated milking into the farm will depend partly on the behaviour of the cow. Diurnal patterns of behaviour and behaviour associated with the use of an automatic milking stall were recorded at 10-min intervals for 5 consecutive days for nine early lactation cows housed in a straw yard. The automatic milking stall was operational between 06:00 h and 0:00 h and was accessible through a selection/recognition stall on route to the forage feed area. Cows attending the feed area within 4 h of a previous milking were diverted directly to feed, by-passing the automatic stall. All cows attended the milking stall voluntarily, on average three times a day. Milking frequency was not consistent throughout the day and was related to diurnal patterns of feeding. Movement to and from milking was hesitant, with cows delaying at both entry and exit gates of the milking stall. A consistent milking order developed becoming more variable as the number of millings per cow per day increased, associated with a similar reduction in synchrony for the maintenance behaviours. Daily activity budgets suggested accommodation to the system through conservation of feeding time and a decrease in lying time. Cows became accustomed to waiting to enter the stall as the experiment

proceeded. In conclusion the cows adapted to using the automated milking stall at their own demand and pace which reduced efficiency and availability.

Keywords: feeding, milking, lactation, automatic milking, automation, adaptation, behavior, diurnal activity, feeding frequency.

Yeruham, I., and O. Markusfeld (1996). **Self destructive behaviour in dairy cattle.** *The Veterinary Record: Journal of the British Veterinary Association* 138(13): 308, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: heifers, udders, teats, mammary edema, skin diseases, symptoms, abnormal behavior, predisposition, excessive licking.

Zahner, M. (1998). **Modified cow trainer reduces stress on the cows. [Modifizierter Kuhtrainer reduziert Belastung bei Kuhen.]** *Agrarforschung* 5(1): 17-20, ISSN: 1022-663X.

NAL Call No.: S469 S9A37.

Keywords: cows, modified cow trainer, electric shocks, electric current stress, restraint of animals, freedom of movement, animal welfare, German language.

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## Breeding

Banos, G. and A. Sigurdsson (June 1996) **Application of contemporary methods for the use of international data in national genetic evaluations.** *Journal of Dairy Science* 79(6): 1117-1125, ISSN: 0022-0302.

NAL Call No.: 44.8 J822.

Keywords: dairy cattle, bulls, genetic material, genetic evaluations across countries, national breeding programs, economically important traits, well-defined breeding goals.

Ballard, C.S., P. Mandebvu, C.J. Sniffen, S.M. Emanuele, and M.P. Carter (2001). **Effect of feeding an energy supplement to dairy cows pre and postpartum on intake, milk yield, and incidence of ketosis.**

*Animal Feed Science and Technology* 93(1-2): 55-69, ISSN: 0377-8401.

NAL Call No.: SF95.A55

Keywords: cows, Holstein, breed, ketosis, metabolic disease, calcium propionate, propylene glycol, beet pulp, ground corn, sugarcane molasses, dietary supplements, lactation, milk yield, tie stall housing.

Boelling, D., P. Madsen, and J. Jensen (2001). **Genetic parameters of foot and leg traits in future AI bulls: II. Correlation to body conformation traits in daughters.** *Acta Agriculturae Scandinavica Section A Animal Science* 51 (2): 122-128, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: dairy AI bulls, breed, Danish Red, Danish Friesian, Jersey, genetic correlations, foot and leg traits, hoof measurements, horn characteristics, claw disease, hoof trimming, scores for rear leg side view, rear leg rear view, bone structure, quality of hocks, foot angle, future selection of AI bulls.

Boer, I.J.M., F.W.A. de Brom, and J.M.G. Vorstenbosch (1995). **An ethical evaluation of animal biotechnology: the case of using clones in dairy cattle breeding.** *Animal Science: An International Journal of Fundamental and Applied Research* 61(3): 453-463, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: dairy cattle, bioethics, moral values, biotechnology, cloning, animal welfare, genetic variation, artificial insemination, personal development.

Cartmill, J.A., S.Z. El-Zarkouny, B.A. Hensley, T.G. Rozell, J.F. Smith, and J.S. Stevenson (2001). **An alternative AI breeding protocol for dairy cows exposed to elevated ambient temperature before or after calving or both.** *Journal of Dairy Science* 84 (4): 799-806, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, lactation, artificial insemination, environmental temperature, synchronized females, gnRH, prostaglandins, timing, estrus, detection, conception rate, pregnancy rate, heat stress, relative humidity, postpartum interval, anestrus, blood serum, progesterone, embryo mortality, summer, Kansas.

Christensen, L.G. (1998). **Possibilities for genetic improvement of disease resistance, functional traits and animal welfare.** In: *Impact of Reproductive Technology on Animal Breeding and Genetic Conservation. Proceedings of the Bertebos Prize Symposium, Falkenberg, Sweden, September 18-19, 1997, No. 29*, S. Einarsson and J. Rendel (ed.), Scandinavian University Press: Oslo; Boston, p. 77-89.

NAL Call No.: S3 A27 Suppl.29

Keywords: breeding programmes, embryo transfer, computer simulation, mathematical models, sires, dams, fertility, selection methods, animal welfare, health, selection, disease resistance, Scandinavia.

Cranford, J.L., and R.E. Pearson (2001). **Relationships of sire predicted transmitting ability for somatic cell score with measures of daughter performance.** *Journal of Dairy Science* 84 (6): 1501-1507, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Holstein, breed, sire predicted transmitting ability, somatic cell score, mastitis occurrence, Virginia Tech dairy herd, linear regression coefficients.

Davis, S.R., I. Vetharanim, M. Upsdell, E.S. Kolver, and A.B. Pleasants (2001). **Modelling the impact of nutrition and genotype on lactation.** *Proceedings of the New Zealand Society of Animal Production* 61: 237-238, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: dairy cows, mammary gland development, reproductive system, milk, reproductive system, secretion, udder, reproductive system, grazing, feeding method, modeling method, genotype, impact, lactation, nutritional status, nutrition impact, pasture, animal feed, New Zealand.

Dekkers, J.C. and J.P. Gibson (1998). **Applying breeding objectives to dairy cattle improvement.** *Journal of Dairy Science* 81(Supplement 2): 19-35.

NAL Call No.: SF221.A4

Keywords: selection criteria, interaction between the scientists and industry, selection indexes, index expression, index formulation, focus on response to selection, construction of component indexes, individual mating decisions, review.

Dekkers, J.C., B.A. Mallard, and K. Leslie (1994). **Workshop: genetic improvement of resistance to mastitis of dairy cattle with special emphasis on somatic cell count.** *Journal of Dairy Science* 77(2): 616-618, ISSN: 0022-0302.

NAL Call No.: 44.8 J822.

Keywords: genetic improvement, resistance to mastitis, physiology, immunology.

Distl, O. (2001). **Implications of health traits in breeding of dairy cattle. [Die Bedeutung Von Gesundheitsmerkmalen in Der Zucht Von Milchrindern.]** *Archiv Fuer Tierzucht* 44 (4): 365-380.

NAL Call No.: 49 AR23

Keywords: German cattle breeds, genetic improvement, health and fertility traits, datasets from Bavaria, Israel and Sweden, heritabilities for disease resistance, genetic variance.

Dobos, R.C., K.S. Nandra, K. Riley, W.J. Fulkerson, I.J. Lean, and R.C. Kellaway (2001). **Effects of age and liveweight at first calving on first lactation milk, protein and fat yield of Friesian heifers.** *Australian Journal of Experimental Agriculture* 41 (1): 13-19, ISSN: 0816-1089.

NAL Call No.: 23 Au792

Keywords: heifers, Australian Holstein Friesian, breed, individual and combined effects of age, and liveweight at first calving, grazed pasture, growth requirements, milk, protein, fat yields, first lactation.

- Duraes, M.C., A.F. de Freitas, J. Valente, N.M. Teixeira, and R.B. Tendencia (2001). **Genetic trend for milk and fat productions for Holstein Cattle in Minas Gerais State.** [Tendencia genetica Para a Producao De Leite e De Gordura Em Rebanhos Da Raca Holandesa No Estado De Minas Gerais.] *Revista Brasileira De Zootecnia* 30 (1): 66-70.  
NAL Call No.: SF1 R45  
Keywords: breed, Holstein, genetic trends, milk and fat yields, statistical analyses, mixed models, herd year season at calving, effect of age at calving, birth records, milk production, Brazil.
- Esslemont, R.J. and M.A. Kossaibati (2000). **The use of databases to manage fertility.** *Animal Reproduction Science* 60/61: 725-741, ISSN: 0378-4320.  
NAL Call No.: QP251.A5  
Keywords: dairy cows, fertility, dairy farming, computer databases, computer techniques, husbandry, management, health, performance, information systems, research, animal welfare, zoonoses, environmental protection, costs, literature reviews.
- Fikse, W.F., and G. Banos (2001). **Weighting factors of sire daughter information in international genetic evaluations.** *Journal of Dairy Science* 84 (7): 1759-1767, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: dairy bulls, international genetic evaluations, national genetic evaluation results, alternative weighting factors on international evaluation results, progeny test scheme, semen exchange, breeding values, weighting factors, total number of daughters, total number of lactations, group size.
- Goni, M.O., A.G. Miah, M.A.S. Khan, and M.N. Islam (2001). **The performance of crossbred cows available in milk pocket area of Bangladesh.** *Indian Journal of Animal Sciences* 71 (1 ): 1166-1168, ISSN: 0367-8318.  
NAL Call No.: 41.8 IN22  
Keywords: crossbred dairy cows, Sahiwal, Holstein-Friesian, breed, Sahiwal, productive, reproductive performance, milk yield, lactation length, reproductive performance, average birth weight of calves, age at puberty, age at first calving, service per conception, postpartum heat period, gestation period, calving interval, breed differences, Bangladesh.
- Grochowska, R., A. Lunden, L. Zwierzchowski, M. Snochowski, and J. Oprzadek (2001). **Association between gene polymorphism of growth hormone and carcass traits in dairy bulls.** *Animal Science* *Pencaitland* 72 (3): 441-447.  
Keywords: bulls, Polish Friesian, breed, leucine/valine substitution polymorphism, amino acid, growth hormone (GH) protein, carcass traits, carcass gain, weights of meat, bones, intermuscular and subcutaneous fat.
- Haile Mariam, M., M.E. Goddard, and P.J. Bowman (2001). **Estimates of genetic parameters for daily somatic cell count of Australian dairy cattle.** *Journal of Dairy Science* 84 (5): 1255-1264, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: genetic parameters, somatic cell counts, sire random regression model, conventional ten trait analyses, first lactation, variation in heritabilities, test day records.
- Hansen, L.B. (2000). **Consequences of selection for milk yield from a geneticist's viewpoint.** *Journal of Dairy Science* 83(5): 1145-1150.  
NAL Call No.: 44.8 J822  
Abstract: The annual genetic trend for milk yield of Holsteins in the United States has accelerated with time and had means of 37 kg during the 1960s, 79 kg during the 1970s, 102 kg during the 1980s, and 116 kg from 1990 to 1996. Selection programs of the dairy cattle breeding firms in the United States have become more selective and effective with time, and selection goals continue to place major emphasis on yield traits, which clearly impact profitability of dairying. Traits other than yield are also included in selection goals of the industry. Type traits, especially those related to udderconformation, body size, and angularity have been included in selection programs and have altered the appearance and physiological

functions of Holstein cows. Selection programs have continued to increase the body size of Holsteins despite mounting evidence that smaller cows have advantages for survival and efficiency. Favorable emphasis on cows that appear sharper might result in cows that are more prone to metabolic problems. The high intensity of current selection in the United States has brought about a rapid increase in genetic relationships among animals. Increased relationships will inevitably result in undesirable levels of inbreeding in the commercial cow population unless dairy producers turn to crossbreeding.  
Keywords: dairy cows, Holstein-Friesian, genetic trend, milk yield, body weight, selection intensity, inbreeding depression, selection responses, female fertility.

Hansen, L.B., J.B. Cole, G.D. Marx, and A.J. Seykora (1999). **Productive life and reasons for disposal of Holstein cows selected for large versus small body size.** *Journal of Dairy Science* 82 (4): 795-801.  
NAL Call No.: 44.8 J822

Abstract: Holstein cows were compared for direct and correlated responses to selection for large versus small body size. The divergent selection lines differed for body weight, body dimensions, and birth weight of calves but did not differ for production or calving ease. Also, cows in the small line required fewer services to conception during first lactation than did cows in the large line. Cows in the body size lines differed for three reasons for disposal: udder conformation, which favored cows in the large line; problems with legs and feet, which favored cows in the small line; and a miscellaneous category, which included internal infections and favored cows in the small line. Productive life to a maximum of 6 yr was 87.7 d (15.4%) longer for cows in the small line than for cows in the large line. Continued selection for larger Holstein cows in North America might not be economically justifiable.

Keywords: dairy cows, size, selection criteria, artificial selection, longevity, productive life, liveweight, birth weight, calving, lactation, conception rate, culling, height, length, diameter.

Healy, P.J. (1996). **Testing for undesirable traits in cattle: an Australian perspective.** *Journal of Animal Science* 74(4): 917-922, ISSN: 0021-8812.  
NAL Call No.: 49 J82

Abstract: A variety of autosomal recessive defects, many lethal to the newborn calf, have been recognized in Australia. Definition of a defect at the biochemical or molecular level facilitates development of heterozygote detection tests essential for efficient disease control programs. The prevalence of alpha-mannosidosis in Angus and Murray Greys, generalized glycogenosis in Brahmans and Shorthorns, and citrullinemia in Holstein/Friesians has been reduced as a result of industry-sponsored disease-control programs. These defects were disseminated as a consequence of selection focused on desirable traits carried by individuals. In the long term, an increase in crossbreeding in commercial beef production will reduce the significance of recessive defects. Caution will be required to reduce the risk of dissemination of recessive defects resulting from increased selection pressure within the dairy industry presently dominated by Holstein/Friesians.

Keywords: cattle, recessive lethals, bulls, genetic defects, breeding value, genetic disorders, cattle breeds, heterozygotes, animal welfare.

Heringstad, B., G. Klemetsdal, and J. Ruane (2001). **Responses to selection against clinical mastitis in the Norwegian cattle population.** *Acta Agriculturae Scandinavica Section A Animal Science* 51 (2): 155-160, ISSN: 0906-4702.  
NAL Call No.: S3 A27

Keywords: genetic trend, clinical mastitis, Norwegian Cattle, mastitis resistance, average selection differential.

Juga, J. (1998). **The Nordic model for animal welfare and sustainability: is it competitive?** In: *Impact of Reproductive Technology on Animal Breeding and Genetic Conservation. Proceedings of the Bertebos Prize Symposium, Falkenberg, Sweden, September 18-19, 1997, No. 29*, S. Einarsson and J. Rendel (ed.), Scandinavian University Press: Oslo; Boston, p. 108-114.  
NAL Call No.: S3 A27 Suppl. 29

Keywords: Finnish dairy cattle, breeding programs, selection, genetic response, animal welfare, health, milk yield, Finland.

- Kadarmideen, H.N., and J.E. Pryce (2001). **Genetic and economic relationships between somatic cell count and clinical mastitis and their use in selection for mastitis resistance in dairy cattle.** *Animal Science* *Pencaitland* 73 (1): 19-28.  
Keywords: cows, Holstein, breed, clinical mastitis, somatic cell count, genetic and economic relationship of lactation average, genetic parameters, permanent environmental, residual and phenotypic correlations, selection for mastitis resistance, breeding goals, genetic resistance.
- Kudrin, A.G. (2001). **The effects of the selection of highly productive Holstein cows according to fermental blood tests.** *Doklady Rossiiskoi Akademii Sel'Skokhozyaistvennykh Nauk* (1): 38-39.  
NAL Call No.: S1 S68  
Keywords: cows, Holstein, breed, blood, selection based on the level of ferments in the serum, milk productivity.
- Larroque, H., and V. Ducrocq (2001). **Relationships between type and longevity in the Holstein breed.** *Genetics Selection Evolution Paris* 33 (1): 39-59.  
NAL Call No.: QH431 A1A52  
Keywords: French Holstein, breed, type traits, longevity, survival analysis model, udder traits, udder depth, length of productive life, voluntary culling, estimated breeding value.
- Lee, D.H., and K.J. Han (2001). **Genetic parameters for lactation using the coupling chains with Gibbs sampler in multivariate animal models with missing traits in Korean Holstein cattle.** *Journal of Animal Science and Technology* 43 (1): 53-64.  
NAL Call No.: SF1.H36  
Keywords: genetic parameters, milk production, lifetime lactation productions, Gibbs sampling vs Bayesian inference, repeatability model, Dairy Cattle Improvement Center, Korea.
- Liinamo, A.E. and J.A. Van Arendonk (1999). **Combining selection for carcass quality, body weight, and milk traits in dairy cattle.** *Journal of Dairy Science* 82(4): 802-809, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: selection strategies, carcass quality, body weight, milk aggregate genotype.
- Lukaszewicz, M. and G. Sender (1999). **Conformation traits in selection indices in dairy cattle, A review.** *Prace i Materialy Zootechniczne* 55: 41-49, ISSN: 0137-1649.  
NAL Call No.: SF1 P67  
Keywords: adaptative complex, animal welfare, breeding goals, conformation traits, ecology, milk yield.
- Meyer, C.L., P.J. Berger, K.J. Koehler, J.R. Thompson, and C.G. Sattler (2001). **Phenotypic trends in incidence of stillbirth for Holsteins in the United States.** *Journal of Dairy Science* 84 (2): 515-523, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: Holstein, breed, stillbirths, dystocia, MidStates Dairy Records Processing Center and the National Association of Animal Breeders, influence of sire, herd, year, season, sex of calf, parity of dam, calving ease, gestation length, survival of the calf, United States.
- Meyer, C.L., P.J. Berger, J.R. Thompson, and C.G. Sattler (2001). **Genetic evaluation of Holstein sires and maternal grandsires in the United States for perinatal survival.** *Journal of Dairy Science* 84 (5): 1246-1254, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: primiparous cows, Holstein, breed, stillbirth, genetic parameters, perinatal survival rates, National Association of Animal Breeders calving ease database, data analysis, effects for sex of calf, dystocia, season of birth, gestation length, milk yield.
- Muller, U., P. Reinecke, W. Leucht, and T. Dalle (1999). **Breeding and biological evaluation of selection for yield in dairy cattle. [Zuchtungsbiologische bewertung der leistungsselektion beim Milchrind.]** *Archiv fur Tierzucht* 42(1): 33-44, ISSN: 0003-9438.

NAL Call No.: 49 AR23

Keywords: dairy cattle, selection, dairy performance, fitness, reviews, natural selection, animal welfare, German language.

Murray, R.D. and W.R. Ward (1993). **Welfare implications of modern artificial breeding techniques for dairy cattle and sheep.** *The Veterinary Record: Journal of the British Veterinary Association* 133(12): 283-286, ISSN: 0042-4900.

NAL Call No.: 41.8 V641.

Keywords: legislation described, cruelty, animal welfare, United Kingdom, farm animal breeding, acceptable practice, public concern, biotechnical innovations.

Nash, D.L., G.W. Rogers, J.B. Cooper, G.L. Hargrove, J.F. Keown, and L.B. Hansen (2000). **Heritability of clinical mastitis incidence and relationships with sire transmitting abilities for somatic cell score, udder type traits, productive life, and protein yield.** *Journal of Dairy Science* 83(10): 2350-2360. ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: cows, grazing, feeding behavior, movement, hygiene, resting/lying down, social behavior, pastures, cattle housing, animal welfare, health, German language, conference paper.

Norman, H.D., R.L. Powell, J.R. Wright, and C.G. Sattler (2001). **Overview of progeny test programs of artificial insemination organizations in the United States.** *Journal of Dairy Science* 84 (8): 1899-1912, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Ayrshires, Brown Swiss, Guernseys, Holsteins, Jerseys, Milking Shorthorns, progeny test programs, artificial insemination, embryo transfer, United States.

Notter, D.R. (1999). **The importance of genetic diversity in livestock populations of the future.** *Journal of Animal Science* 77(1): 61-69, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: Farm animal genetic diversity is required to meet current production needs in various environments, to allow sustained genetic improvement, and to facilitate rapid adaptation to changing breeding objectives. Production efficiency in pastoral species is closely tied to the use of diverse genetic types, but greater genetic uniformity has evolved in intensively raised species. In poultry, breeding decisions are directed by a few multinational companies and involve intense selection, the use of distinct production lines, and very large populations. In dairy cattle, the Holstein breed dominates production. Intensive sire selection is leading to relatively rapid inbreeding rates and raises questions about long-term effects of genetic drift. Key questions in management of farm animal genetic diversity involve the distribution of potentially useful quantitative trait locus alleles among global livestock breeds. Experiments with tomato, maize, and mice suggest that favorable alleles can exist in otherwise lowly productive stocks; this cryptic variation may potentially contribute to future selection response. Genetic improvement under relatively intense unidirectional selection may involve both increases in the frequency of favorable additive alleles as well as the progressive breakdown of homeostatic regulatory mechanisms established under the stabilizing selection that is characteristic of natural populations. Recombination among closely linked regulatory loci and new, potentially favorable mutations are possible sources of long-term genetic variation. A greater understanding of the potential that these alternative mechanisms have for supporting long-term genetic improvement and of genetic relationships among global livestock populations are priorities for managing farm animal genetic diversity.

Keywords: global livestock populations, poultry, dairy, production efficiency, genetic uniformity, intensive livestock production, inbreeding rates, genetic drift, quantitative trait locus alleles, unidirectional selection, review.

Ojango, J.M.K., and G.E. Pollott (2001). **Genetics of milk yield and fertility traits in Holstein Friesian cattle on large scale Kenyan farms.** *Journal of Animal Science* 79 (7): 1742-1750, ISSN: 0367-8318.

NAL Call No.: 41.8 IN22

Keywords: cows, bulls, Holstein Friesian, breed, milk production, genetic trends, fertility traits, average

breeding values large, lactation length, calving interval, age at first calving. Large, medium, and small farms in Kenya.

Pelicioni, L.C., and S.A. de Queiroz (2001). **Effect of cytoplasmic lineage on milk yield of Caracu cattle breed.** [Efeito da linhagem citoplasmatica sobre a producao de leite em bovinos da raca Caracu.] *Revista Brasileira De Zootecnia* 30 (1): 109-114.

NAL Call No.: SF1 R45

Keywords: Caracu, breed cytoplasmic lineage, milk yield, genetic parameters, milk yield, maternal and cytoplasmic lineage effects.

Philipsson, J., G. Banos, and T. Arnason (1994). **Present and future uses of selection index methodology in dairy cattle.** *Journal of Dairy Science* 77(10): 3252-3261, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: breeding value, single traits, multiple-trait evaluation, covariance component estimation, nonlinear models, discounted gene flow, dynamic programming, international sire evaluations, computing power, integrated AI, recording schemes, functional nonproduction traits, mastitis resistance, fertility, review.

Plante, Y., J.P. Gibson, J. Nadesalingam, Y.H. Mehrabani, S. Lefebvre, G. Vandervoort, and G.B. Jansen (2001). **Detection of quantitative trait loci affecting milk production traits on 10 chromosomes in Holstein cattle.** *Journal of Dairy Science* 84 (6): 1516-1524, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Holstein, breed, sires, quantitative trait loci, milk, fat, protein yield.

Riquet, J., W. Coppieters, N. Cambisano, J.J. Arranz, et al. (1999). **Fine-mapping of quantitative trait loci by identity by descent in outbred populations: application to milk production in dairy cattle.**

*Proceedings of the National Academy of Sciences of the United States of America* 96(16): 9252-9257, ISSN: 0027-8424.

NAL Call No.: 500 N21P

Keywords: Holstein-Friesian cows, sires, breeding, selection, genetics, quantitative trait locus (QTL), milk production, nucleotide polymorphisms, fine-mapping, marker-assisted segregation, milk fat haplotype.

Rocha, J.L., J.O. Sanders, D.M. Cherbonnier, T.J. Lawlor, and J.F. Taylor (1998). **Blood groups and milk and type traits in dairy cattle: after forty years of research.** *Journal of Dairy Science* 81(6): 1663-1680, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Holstein breeding schemes, quantitative variation, trait loci, linear models, C blood group effect, rump angle, L effect on milk yield, composition traits, S effect on milk fat yield, biochemistry, physiology, quantitative genetics.

Roxstrom, A., E. Strandberg, B. Berglund, U. Emanuelson, and J. Philipsson (2001). **Genetic and environmental correlations among female fertility traits and milk production in different parities of Swedish Red and White dairy cattle.** *Acta Agriculturae Scandinavica Section A Animal Science* 51 (1): 7-14, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: genetic correlations, fertility, production traits, number of inseminations per service, number of treatments for reproductive disturbances, interval between first and last inseminations, interval between calving and first insemination, interval between calving and last insemination, early milk production.

St Pierre, N.R. (2001). **Invited review: integrating quantitative findings from multiple studies using mixed model methodology.** *Journal of Dairy Science* 84 (4): 741-755, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: relationships between environment and management, profit margins, improved mathematical

and statistical tools, computer technology, accurate information, published studies, future research, quantitative models, studies as blocks, random effects, predictor variables, regression models, biased, variance estimates, statistical software, meta analyse.

Veerkamp, R.F., E.P.C. Koenen and G. De Jong(2001). **Genetic correlations among body condition score, yield, and fertility in first-parity cows estimated by random regression models.** *Journal of Dairy Science* 84(10): 2327-2335, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, body condition score, analytical method, fertility, genetic correlation, heritability, lactation, milk yield, parity, random regression model.

Weigel, K.A., T. Kriegl, and A.L. Pohlman (1999). **Genetic analysis of dairy cattle production traits in a management intensive rotational grazing environment.** *Journal of Dairy Science* 82(1): 191-195, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: low input dairy herd management, predictability of progeny performance, lactation data, heritability estimates, milk, fat, and protein content, progeny testing, US dairy producers.

Zwald, N.R., K.A. Weigel, W.F. Fikse, and R. Rekaya (2001). **Characterization of dairy production systems in countries that participate in the International Bull Evaluation Service.** *Journal of Dairy Science* 84(11): 2530-2534, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

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## Feeding

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Keywords: multiparous lactating Holstein cows, feeding value, red clover, alfalfa silages, dry matter intake, red clover, alfalfa plus red clover, milk yield, milk components, total protein, true protein were higher on red clover corn silage with added soybean meal.
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NAL Call No.: SD387 M8A3  
Keywords: crossbred dual purpose cattle, *Cratylia argentea*, drought tolerant shrub, nutritive value, protein supplement, *Hyparrhenia rufa*, dry season, Costa Rica.
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Keywords: dairy cows, Swedish Red-and-White, milking, feeding, timing, physical activity, rumination, eating, drinking, blood plasma, hydrocortisone, hormone secretion, animal welfare.
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NAL Call No.: 41.8 D482.  
Keywords: tongue rolling, total body manganese status, manganese deficiency, hair, diet content, inorganic Phosphorus, Greece, German language.
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NAL Call No: S419 A28 no. 211  
Keywords: doctoral thesis, behaviour, calves, CCK, cortisol, dairy cows, feeding, gastrin, insulin, milking, oxytocin, prolactin, somatostatin, suckling, milk yield, prestimulation.
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Keywords: Bos Taurus, dairy calves, effects of different amounts of milk, flow rate of milk, and access to a teat, non nutritive sucking, empty teat, cross sucking on other calves.

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Keywords: automatic feed dispensers, concentrates, cow housing, cows, dairy cows, feed intake, feeding behavior, loose housing, milk yield, stress, stress response, Finnish language.
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NAL Call No.: SF95.A55  
Keywords: dairy cows, grass silage, concentrates, energy sources, rumen fermentation, lactation, feed intake, animal husbandry, ammonium nitrogen, crop management, regrowth, silage additives, pH, dry matter, fiber content, crude protein, protein digestibility, acetic acid, propionic acid, milk fat percentage.
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NAL Call No.: 44.8 J822  
Keywords: dairy cows, concentrate feeding, grass silage late gestation, feed intake, milk yield, milk composition, fertility.
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Keywords: cows, Finnish Holstein Friesian, breed, different types of energy or protein supplementation, grass silage, grain sources, barley, maize, physical processing, rapeseed meal, protein supplement, blood beta hydroxybutyrate, plasma urea concentrations, milk yield, milk protein, food intake.
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NAL Call No.: 44.8 J822  
Keywords: cows, concentrate to forage ratio, rumen fermentation, rumen cannulas, total mixed ration, ad libitum, dry matter, rumen pH, milk fat concentration, negative effects, high grain diets.
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NAL Call No.: SF55 A78A7  
Keywords: milk production, sward structure, strip grazing system, measurements of sward factors, herbage intake, herbage allowance, perennial ryegrass (*Lolium perenne* L.).
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NAL Call No.: 44.8 J822

Keywords: cows, breed, Holstein, dietary nitrogen and phosphorus partitioning, soybean meal, blood meal, mono and di calcium phosphate, wheat bran, feces, urine, milk.

Kumagai, H., Y. Chaipan, and K. Mitani (2001). **Effects of periparturient vitamin A supplementation on vitamin A concentrations in colostrum and milk from dairy cows, and plasma retinol concentrations, feed intake and growth of their calves.** *Animal Science Journal* 72 (2): 126-133, ISSN: 1344-3941.

NAL Call No.: SF1 A542

Keywords: cows, breed, Holstein Friesian, periparturient vitamin A supplementation, vitamin A concentrations in colostrum and milk, plasma retinol concentrations, feed intake, calf growth, liveweight gain.

Kyne, S., M.J. Drennan, and P.J. Caffrey (2001). **Influence of concentrate level during winter and date of turnout to pasture on the performance of cattle and the effect of grazing of silage ground on grass yield and quality.** *Irish Journal of Agricultural and Food Research* 40 (1): 23- 32.

NAL Call No.: S539.5 I74

Keywords: steers, heifers, concentrates, ad libitum grass silage, grazing season, live weight gain, carcass weight.

Lean, I.J. (2001). **Association between feeding perennial ryegrass (*Lolium perenne* cultivar grasslands impact) containing high concentrations of ergovaline, and health and productivity in a herd of lactating dairy cows.** *Australian Veterinary Journal* 79 (4): 262-264.

NAL Call No.: 41.8 Au72

Keywords: cows, breed, Holstein Friesian, perennial ryegrasses, fungal endophyte (*Neotyphodium lolii*), production of alkaloids, including *Lolitrem B* and ergovaline, toxic effects in animals, decrease in milk production.

Lindström, T. (2000). **Feeding Behaviour in Dairy Cows: Motivational Aspects** Swedish University of Agricultural Sciences: Uppsala, Acta Universitatis Agriculturae Sueciae. Agraria: 1401-6249, 250.

NAL Call No.: S419 A28 no. 250.

Keywords: doctoral thesis, feeding, behaviour, feeding duration, rumen fill, stereotypies, feed-searching, operant conditioning, oral manipulation, oxytocin, cortisol concentrations.

Loberg, J., and L. Lidfors (2001). **Effect of milkflow rate and presence of a floating nipple on abnormal sucking between dairy calves.** *Applied Animal Behaviour Science* 72 (3): 189-199, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, breed, Swedish Red and White, access to an artificial teat, open bucket, abnormal sucking, time drinking, treatments, bucket with fast flow, bucket with slow flow, floating nipple with fast flow and floating nipple with slow flow, behavioral observations,.

Logue, D.N. and J.E. Offer (2001). **The effect of forage type on foot health in dairy heifers.** *Veterinary Journal* 162 (1): 7-8, ISSN: 1090-0233.

NAL Call No.: SF601.V484

Keywords: heifer, claw horn lesions, injury, diet; foot health, forage type, lameness.

Luepping, W. (2001). **Monitoring of feeding situation and health with physiologically based parameters. [Fuetterungs- und Gesundheitsmonitoring mit physiologischen Parametern.]** *Zuechtungskunde* 73(6): 460-470, ISSN: 0044-5401.

Keywords: dairy cow, Holstein, breed, bilirubin, calcium, glutamate dehydrogenase, phosphorus, protein, selenium, urea, feed, fiber content, roughage content, starch content, health monitoring, lactation curve, milk, dairy product, milk production, net acid-base excretion, German language.

Manninen, M., and H. Huhta (2001). **Influence of pre partum and post partum plane of nutrition on the performance of crossbred suckler cows and their progeny.** *Agricultural and Food Science in Finland* 10 (1): 3-18.

NAL Call No.: S3 A335

Keywords: cows, calves, Hereford Ayrshire, Limousine Ayrshire, breed, pre partum feeding, post partum, feeding, hay, straw, concentrate feeding, dry matter, barley, live weight gain, milk production, conception rate, plane of nutrition, Finland.

McCormick, M.E., J.D. Ward, D.D. Redfearn, D.D. French, D.C. Blouin, A.M. Chapa, and J. M. Fernandez (2001). **Supplemental dietary protein for grazing dairy cows: effect on pasture intake and lactation performance.** *Journal of Dairy Science* 84 (4): 896-907.

NAL Call No.: 44.8 J822

Keywords: cows, Holstein, breed, multiparous, primiparous, grain supplement evaluation, crude protein, rumen undegradable protein, rotational grazing, annual ryegrass oat pastures, soybean meal, corn gluten meal blood meal mixture, milk yield.

Mertens, D.R. (1997). **Creating a system for meeting the fiber requirements of dairy cows.** *Journal of Dairy Science* 80(7): 1463-1481, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: roughage value, neutral detergent fiber, chewing activity, fiber content, requirements, mastication, carbohydrates, rumen fermentation, milk fat percentage, hay, chop length, forage, silage, concentrates, feeds, in vitro digestibility, particle size, lactation stage, rumen contents, pH, literature reviews.

Morel, I. (2000). **Use of cereals instead of milk substitute in the diet of veal calves. [Einsatz von Getreide anstelle von Milchersatzfutter beim Mastkalb.]** *Agrarforschung* 7(1): 24-29, ISSN: 1022-663X.

NAL Call No.: S469 S9A37

Keywords: veal calves, diet, milk substitutes, animal welfare, barley, cereals, costs, diets, finishing, feed dispensers, feeding, hemoglobin, health, iron, maize, minerals, vitamins, production costs, Switzerland, German language.

Morel, I. (2000). **Cereals instead of milk substitute in the diet of the veal calves. [Remplacement de l'aliment d'allaitement par des cereales chez le veau a l'engrais.]** *Revue Suisse d'Agriculture* 32(1): 43-48, ISSN: 0375-1325.

Keywords: veal calves, feed intake, costs, milk substitutes, animal welfare, appetite, barley, cereals, diets, finishing, automatic feed dispensers, feeding, hemoglobin, health, intake, iron, maize, minerals, production costs, vitamins, French language.

Morisse, J.P., D. Huonnic, J.P. Cotte, and A. Martrenchar (2000). **The effect of four fibrous feed supplementations on different welfare traits in veal calves.** *Animal Feed Science and Technology* 84 (1/2): 129-136.

NAL Call No.: SF95 A55

Keywords: veal calves, animal welfare, feed supplements, fiber, starch, feeds, rumen, health, performance, rumination, rumen mucosa, rumen fermentation, carcass weight, abomasum, rumen digestion, growth rate, lignin, crude protein, ash, peptic ulcers, bezoar.

Morisse, J.P., J.P. Cotte, and D. Huonnic, and A. Martrenchar (1999). **Influence of dry feed supplements on different parameters of welfare in veal calves.** *Animal Welfare* 8(1): 43-52, ISSN: 0962-7286.

NAL Call No.: HV4701.A557

Keywords: carcass weight, veal calves, rumen motility, behavior, animal welfare, dry feeds, wet feeding, liquid diets, rumen, rumination, hematology.

Morrow, C.J., E.S. Kolver, K.A. Macdonald, G.A. Verkerk, and L.R. Matthews (2001). **Monitoring adrenal activity in dairy cows under various feeding regimens using faecal glucocorticoid metabolites.** *Proceedings of the New Zealand Society of Animal Production* 61: 52-55, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: dairy cows, Holstein Friesian, breed, adrenal activity, plasma glucocorticoid concentrations,

fecal glucocorticoid concentrations, feeding, pastoral conditions, concentrate based, genotype effects, stocking rates, stress.

Mulling, C.K., H.H. Bragulla, S. Reese, K.D. Budras, and W. Steinberg (1999). **How structures in bovine hoof epidermis are influenced by nutritional factors.** *Zentralblatt Für Veterinärmedizin. Reihe C, Anatomia, Histologia, Embryologia: Journal Der Weltvereinigung Der Veterinär Anatomen* 28(2): 103-108, ISSN: 0340-2096.

NAL Call No.: SF761.Z4

Keywords: hoof epidermis, nutrition, horn quality, keratinization, cornification, bovine hoof epidermis, lipids, minerals, calcium, vitamins, biotin, dyskeratotic, light and transmission electron microscopy, histochemical and enzyme-histochemical techniques.

Nagel, S. (1996). **Feeding management of high yielding cows: experiences from Canada and the USA. [Fütterungsmanagement von Hochleistungskuhlen: Erfahrungen aus Kanada und den USA.]** *Milchpraxis* 34(2): 104-107, ISSN: 0026-3753.

NAL Call No.: SF221 M5

Keywords: feeding management, high-yielding dairy cows, lactation, body condition, feed intake, ration formulation, grass and maize silages, maize gluten, brewers grains, soybean meal, molasses, crushed barley, shredded maize cobs, nutrients, intensive production, intensive husbandry, USA, Canada, German language.

National General (2001). **Nutrient Requirements of Dairy Cattle** Subcommittee on Dairy Cattle Nutrition, Committee on Animal Nutrition, Board on Agriculture, National Research Council, 7th rev. ed., National Academy Press: Washington, D.C., 381 p. + 1 computer disc (4 3/4 in.)

NAL Call No: SF203 N883 2001

Keywords: nutritional requirements, feeding, feeds, forages, concentrates, feeding strategies, minerals, vitamins, metabolites, by-products, ration formulation, nutrient allowances.

Ndiweni, N. (2001). **In vivo vitamin E/selenium supplementation improved leukocyte function in dairy cows.** *Inflammation Research* 50 (Supplement 3): S192, ISSN: 1023-3830.

NAL Call No.: RS122 A3

Keywords: immune System, selenium, in vivo supplementation, vitamin E, in vivo supplementation, inflammation, leukocyte.

Nour, A.A. (1996). **Milk replacer as a sole feed for veal production from Holstein Friesian calves: 1. Effect of frequency of feeding milk replacer and age of animals on growth, feed utilization and quality of meat.** *Alexandria Journal of Agricultural Research* 41(3): 11-21, ISSN: 0044-7250.

NAL Call No.: 24 AL2

Keywords: male Holstein Friesian calves, milk substitutes, digestibility coefficients, feeding frequency, body weight, dressing percentage, live weight gain, costs, feeding frequency, nitrogen balance, nitrogen, excretion, meat quality, age, feed conversion efficiency, carcass weight, Egypt.

Offer, J.E., D.N. Logue, and D.J. Roberts (1997). **The effect of protein source on lameness and solear lesion formation in dairy cattle.** *Animal Science: An International Journal of Fundamental and Applied Research.* 65(2): 143-149, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: breed, Holstein-Friesian, protein sources, dietary protein, soybean oilmeal, complete feeds, lameness, laminitis, fish meal, blood meal, hooves, meat and bone meal, milk yield, body weight, liveweight gain, body condition, hardness, foot diseases, blood composition, metabolites.

Olofsson, J. (1999). **Competition for total mixed diets fed for ad libitum intake using one or four cows per feeding station.** *Journal of Dairy Science* 82(1): 69-79, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: When dairy cow facilities are being designed, a limited feeding area might be profitable and recommendable if the increased competition for feed does not harm the welfare of the animals or affect

production negatively. An experiment was conducted at the University Cattle Research Centre (Uppsala, Sweden) to investigate the performance of individual cows as well as groups of cows. Treatments used 1 or 4 cows per feeding station with a total mixed diet fed for ad libitum intake. The feeding stations were troughs placed on electronic balances and were 1.08 m wide. Sixteen dairy cows were divided into two groups and were studied in an experiment with a change over design so that each group went through each treatment twice. A computerized feeding system automatically recorded consumption data for feed and water. Video recordings were used to study the social dominance order, the level of aggression at the feeding area, and the time budget of the cows. The mean feed intake increased slightly, but the number of visits to the feeding stations did not change at the higher level of competition. The cows, however, spent significantly less time eating and increased their consumption rate when the competition level increased. The number of displacements at the feeding stations increased dramatically. Cows of low social rank were much more frequently displaced while eating. The effects of dominance value, age, eating rate, and energy requirement of the cows are presented.

Keywords: dairy cows, feed troughs, complete feeds, feed intake, water intake, social dominance, eating rates, intraspecific competition, Swedish Red-and-White, feeding frequency, physical activity, age differences, energy requirements.

Olofsson, J., and H. Wiktorsson (2001). **Competition for total mixed diets fed restrictively using one or four cows per feeding station.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(1): 59-70, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: cows, housing, feeding stations, computerized feeding, feed intake, feeding behaviour, social dominance, aggression, video recordings, Sweden.

Oresnik, A. (2001). **Current aspects and solutions in dairy cattle nutrition.** *Krmiva* 43 (6): 323-328, ISSN: 0023-4850

NAL Call No.: 389.78 K89

Keywords: dairy cattle, dairy farms, milk production, milk yield, fertility, herd health, nutrition, high roughage diets, profits, rural development, environmental preservation, animal welfare, human health, Slovenia.

Orr, R.J., S.M. Rutter, P.D. Penning, and A.J. Rook(2001). **Matching grass supply to grazing patterns for dairy cows.** *Grass and Forage Science* 56 (4): 352-361, ISSN: 0142-5242.

NAL Call No.: 60.19 B773

Keywords: dairy cows, Holstein-Friesian, breeds, spring-calving, daily grass allowance, strip-grazing system, carbohydrate concentrations, ruminating time, perennial ryegrass.

Penno J.W., K.A. Macdonald, and C.W. Holmes (2001). **Toward a predictive model of supplementary feeding response from grazing dairy cows.** *Proceedings of the New Zealand Society of Animal Production* 61: 229-233, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: dairy cows, grazing, feeding method, multiple regression analysis, mathematical method, pasture based supplementary feeding, predictive model, lactation, stage, maize, grain, milk production, value, milk solids.

Petit, H.V., R.J. Dewhurst, J.G. Proulx, M. Khalid, W. Haresign and H. Twagiramungu (2001). **Milk production, milk composition, and reproductive function of dairy cows fed different fats.** *Canadian Journal of Animal Science* 81 (2): 263-271.

NAL Call No.: 41.8 C163

Keywords: cows, Holstein, gestating multiparous, Megalac(R), flaxseed meal (MEGA), whole flaxseed treated with formaldehyde (FLAX), milk production, milk composition, follicular development, gestation rate, and fatty acid (FA) composition of blood, increased fat mobilization, increased milk yield.

Phillips, C.J.C., and M.I. Rind (2001). **The effects of frequency of feeding a total mixed ration on the production and behavior of dairy.** *Journal of Dairy Science* 84 (9): 1979-1987, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, housing, feeding, feeding behavior, standing, ruminating, feeding frequency, milk yield, nutrition

Porfir'ev, I.A. (2001). **Metabolism disturbances in high productive milk cows during unsatisfactory conditions of feeding and keeping.** *Sel'Skokhozyaistvennaya Biologiya* 2:20-40.

NAL Call No.: S13.S44

Keywords: cows, high producing, Black and White, Kholmogorskaya, breeds, metabolic diseases, carbohydrate, lipid, protein, phosphorus calcium, vitamin A metabolisms, liver function, reproductive disorders.

Prescott, N.B., T.T. Mottram, and A.J.F. Webster. (1998). **Effect of food type and location on the attendance to an automatic milking system by dairy cows and the effect of feeding during milking on their behaviour and milking characteristics.** *Animal Science: An International Journal of Fundamental and Applied Research* 67(2): 183-193, ISSN: 1357-7298.

NAL Call No.: SF1 A56

Keywords: automatic milking systems, behavior, feeding, concentrates, milking parlors, milking rate, milk flow, milk yield, milking interval.

Pulido, R.G., and J.D. Leaver (2001). **Quantifying the influence of sward height, concentrate level and initial milk yield on the milk production and grazing behaviour of continuously stocked dairy cows.** *Grass and Forage Science* 56 (1): 57-67, ISSN: 0142-5242.

NAL Call No.: 60.19 B773

Keywords: cows, Holstein Friesian, breed, cows sward height, concentrate level, initial milk yield, milk production, grazing behaviour, dry matter intake, grazing time.

Redbo, I., M. Emanuelson, K. Lunberg, N. Oredsson (1996). **Feeding level and oral stereotypies in dairy cows.** *Animal Science: An International Journal of Fundamental and Applied Research* 62(2): 199-206, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: dairy cows, lactation stage, unrestricted feeding, Swedish Red-and-White, restricted feeding, abnormal behavior, rumination, eating, feed intake, physical activity, posture, animal welfare, complete feeds, plane of nutrition.

Rind, M.I. and C.J.C. Phillips (1999). **The effects of group size on the ingestive and social behavior of grazing dairy cows.** *Animal Science: An International Journal of Fundamental and Applied Research* 68(4): 589-596, ISSN: 1357-7298.

NAL Call No.: SF1 A56

Keywords: group size, effects, social behavior, ingestive behavior, rumination, biting rates, mastication, body condition.

Riond, J. L. (2001). **Animal nutrition and acid-base balance.** *European Journal of Nutrition* 40(5): 245-254, ISSN: 1436-6207.

NAL Call No.: QP141 A1E97

Keywords: acid base disorders, alkalosis, animal nutrition, bones, cows, dairy cattle, dairy cows, disease prevention, domestic animals, fractures, hypocalcaemia, mineral content, parturient paresis.

Roche, J.R., E.S. Kolver, M J. de Veth, and A. Napper (2001). **Diet and genotype affect plasma calcium, magnesium and phosphorus concentrations in the periparturient cow.** *Proceedings of the New Zealand Society of Animal Production* 61: 168-171, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: dairy cows, Holstein-Friesian, breed, nutrient requirements, periparturient diseases, parturient hypocalcemia, parturient hypomagnesemia, calcium concentration, magnesium concentration, phosphorus concentration, pasture, pasture silage, diet, feeding method, total mixed ration diet, genotype, total mixed ration.

- Rook, A.J. and C.A. Huckle (1997). **Activity bout criteria for grazing dairy cows.** *Applied Animal Behaviour Science* 54(2): 89-96, ISSN: 0168-1591.  
NAL Call No.: QL750.A6  
Keywords: behavior, grazing, bout criteria, feeding, nutrition.
- Rossi, F., P. Vecchia, and F. Masoero (2001). **Estimate of methane production from rumen fermentation.** *Nutrient Cycling in Agroecosystems* 60(1-3): 89-92, ISSN: 1385-1314.  
NAL Call No.: S631 F422  
Keywords: dairy cows, CH<sub>4</sub> emission, air pollution, concentrates, animal feeds, corn silage, diet, hay, milk production, rumen fermentation, in vitro volatile fatty acid (VFA) production.
- Ruiz, R., P.J. Van Soest, M.E. Van Amburgh, D.G. Fox, and J.B. Robertson (2001). **Use of chromium mordanted neutral detergent residue as a predictor of fecal output to estimate intake in grazing high producing holstein cows.** *Animal Feed Science and Technology* 89 (3-4): 155-164, ISSN: 0377-8401.  
NAL Call No.: SF95.A55  
Keywords: cows, Holstein, breed, lactating, high producing, grazing, chromium mordanted neutral detergent residue, cobalt EDTA, predictors of dry matter intake, total mixed ration, housed in confinement.
- Salewski, A. (1998). **Calculation of feed rations and feeding management in the USA. [Berechnung von Futterrationen und Futtermanagement in den USA.]** *Milchpraxis* 36(4): 168-171, ISSN: 0026-3753.  
NAL Call No.: SF221.M5  
Keywords: cattle feeding, dairy cows, feed rations, uptake, rumen, proteins, carbohydrates, nutritive value, planning, milk yield, lactation, dry period, health, animal welfare, somatotropin, body condition scores, German language.
- Samuelsson, B., K. Uvnas-Moberg, R. Gorewit, and K. Svennersten-Sjaunja (1996). **Profiles of the hormones somatostatin gastrin, CCK, prolactin, growth hormone and cortisol. I. In dairy cows that are milked and fed separately or milked and fed simultaneously.** *Livestock Production Science* 46(1): 49-56, ISSN: 0343-0200.  
NAL Call No.: SF761 Z4  
Keywords: hormonal profiles, milking, feeding, feed deprivation.
- Schwager, S.R., C. Stricker, D. Erdin, and N. Kunzi (2001). **Quantification of changes in body weight and body condition scores during lactation by modeling individual energy balance and total net energy intake.** *Animal Science Pencaitland* 72 (2): 325-334.  
Keywords: cows, Holstein Friesians, Jerseys, Holstein Jersey, breed, individual energy balances, total net energy intake, body condition score change, quality of roughage, body tissue change, milk production, maintenance.
- Seimiya, Y.M., F. Kikuchi, N. Yamaguchi, K. Sugawara, and Y. Nakashima (2001). **Effective control of periparturient diseases in dairy cows owing to preparturient feed management practices.** *Animal Science Journal* 72(10): J587-J593, ISSN: 1344-3941.  
NAL Call No.: SF1 A542  
Keywords: cows, heifer, Holstein, breed, periparturient disease, prevention and control, reproductive system disease, preparturient feed management practices, high energy feeds, gestation, Japanese language.
- Silanikove, N., E. Maltz, A. Halevi, and D. Shinder (1997). **Metabolism of water, sodium, potassium, and chlorine by high yielding dairy cows at the onset of lactation.** *Journal of Dairy Science* 80(5): 949-956, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: cows, dairy cattle, water, hot climates, heat stress, ions, metabolism, lactation, water intake,

feed intake, environmental temperature, electrolytes, sodium, potassium, chloride, energy intake, respiration, animal welfare, health, kidneys, milk yield, Israel.

Skidmore, A.L., A. Brand, and C.J. Sniffen (1996). **Monitoring milk production: defining preset targets and execution.** In: *Herd Health and Production Management in Dairy Practice* A. Brand, J.P.T.M. Noordhuizen, and Y.H. Schukken (eds.), Wageningen Pers: Wageningen, Netherlands, p. 223-262, ISBN: 9-07-413434-3.

NAL Call No.: SF239 B73 1996

Keywords: cows, milk quality, milk recording results, dairy farms, inspection, herd health program, cow housing, feed troughs, feed mixing, feed intake, feed formulation, nutrient requirements, feces composition, milk yield, feeding techniques.

Soriano F.D., C.E. Polan, C.N. Miller (2001). **Supplementing pasture to lactating Holsteins fed a total mixed ration diet.** *Journal of Dairy Science* 84(11): 2460-2468, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Holstein dairy cows, pasture, orchardgrass, white clover, Kentucky bluegrass, acid detergent fiber, crude protein, neutral detergent fiber, body condition score, body weight, income-over-feed cost, lactation, milk, dairy product, yield, pasture grazing, total mixed ration diet

Steinwidder, A., B.M. Ehm, E. Zeiler, L. Gruber, and F. Lettner (2001). **Effect of day or night grazing on forage intake and grazing behaviour of dairy cows. [Einfluss von tag oder nachtweidehaltung auf Futteraufnahme und Fressverhalten von Milchkuhen.]** *Zuechtungskunde* 73 (3): 215-232, ISSN: 0044-5401.

Keywords: cows, grazing conditions, feed intake, grazing behavior, during day and night, fresh forage, fed in the stable, energy concentration, total feed, protein intake, nutrient supply, climatic conditions.

Stockdale, C.R. (1999). **Effect of length of the period of supplementation with concentrates on pasture intake and performance of grazing dairy cows.** *Australian Journal of Experimental Agriculture* 39(7): 803-809, ISSN: 0816-1089.

NAL Call No.: 23 Au792

Keywords: pasture, intake, performance, supplementation, feed concentration, grazing, feed intake, feed duration, performance, milk yield, herbage seasonal variation, dry matter, body condition.

Tesfa, A.T., T. Kokkonen, M. Tuori, T. Saukko, L.A. Lindberg, R. Poso, H. Saloniemi, and O.L. Syrjala (2001). **The effect of prepartum protein feeding on post partum lactation performance of Ayrshire heifers and cows.** *Journal of Animal and Feed Sciences* 10 (1): 73-89.

NAL Call No.: SF1 J68

Keywords: cows, heifers, Ayrshire, breed, cows, multiparous cows, prepartum rapeseed meal supplement, oats, barley, grass silage, feed intake, body condition, body weight change, milk yield, milk composition.

Thammacharoen, S., S. Chanpongsang, and N. Chaiyabutr (2001). **Effects of monensin administration on mammary function in late lactating crossbred Holstein cattle.** *Asian-Australasian Journal of Animal Sciences* 14(12): 1712-1718, ISSN: 1011-2367.

NAL Call No.: SF55 A78A7

Keywords: Holstein crossbreds, cows, acetate, allantoin, propionate, sodium monensin, dietary supplement, slow release capsule, lactation, mammary function, milk yield

Thomas, T., D.M. Weary, and M.C. Appleby (2001). **Newborn and 5-week-old calves vocalize in response to milk deprivation.** *Applied Animal Behaviour Science* 74(3): 165-173, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, newborn animals, calf feeding, milk, deprivation, supplementary feeding, vocalization, individual characteristics, weaning, age differences, animal welfare.

- Thomas, C., K.A. Leach, D.N. Logue, C. Ferris, and R.H. Phipps (1999). **Management options to reduce load.** *Cattle Practice* 7(1): 121-122, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: animal health, dairy cattle, cows, metabolism, animal welfare, reproductive performance, management, energy balance.
- Tikofsky, J.N., M.E. Van Amburgh, and D.A. Ross (2001). **Effect of varying carbohydrate and fat content of milk replacer on body composition of Holstein bull calves.** *Journal of Animal Science* 79 (9): 2260-2267, ISSN: 0021-8812.  
NAL Call No.: 49 J82  
Keywords: dairy bulls, calves, dietary carbohydrate, dietary fat, milk substitutes, body composition, nutrient intake, liveweight, lactose, crude protein, dietary protein, energy intake, protein intake, dry matter, liveweight gain, growth rate.
- Tolkamp, B.J., D.P.N. Schweitzer, and I. Kyriazakis (2000). **The biologically relevant unit for the analysis of short-term feeding behavior of dairy cows.** *Journal of Dairy Science* 83(9): 2057-2068, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: dairy cows, feeding frequency, duration, feeds, protein content, feed intake, feeding habits, satiety, data analysis, meal patterns.
- Tolkamp, B.J., I. Kyriazakis, J.D. Oldham, M. Lewis, R.J. Dewhurst, and J.R. Newbold (1998). **Diet choice by dairy cows. 2. Selection for metabolizable protein or for ruminally degradable proteins?** *Journal of Dairy Science* 81(10): 2670-2680, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: dietary protein, feeding preferences, unrestricted feeding, lactation stage, feed intake, urea, milk yield, nutritive ratio.
- Tolkamp, B.J. and I. Kyriazakis (1997). **Measuring diet selection in dairy cows: effect of training on choice of dietary protein level.** *Animal Science: An International Journal of Fundamental and Applied Research* 64(2): 197-207, ISSN: 1357-7298.  
NAL Call No.: SF1.A56  
Keywords: food intake, food preferences, protein intake, dietary protein, nutritive ratio, complete feeds, grass silage, concentrates, milk yield, protein intake.
- Toullec, R. and J.P. Lalles (1996). **Digestion of substitution proteins by veal calves. [Digestion des protéines de substitution par le veau de boucherie.]** *Revue Suisse d'Agriculture* 28(5): 272-275, ISSN: 0375-1325.  
NAL Call No.: S5 R4  
Keywords: milk substitutes, dried skim milk, protein sources, veal calves, calf feeding.
- Uchida, K., C.S. Ballard, P. Mandebvu, C.J. Sniffen, and M.P. Carter (2001). **Effect of variation in proportion of cornmeal and steam rolled corn in diets for dairy cows on behavior, digestion, and yield and composition of milk.** *Journal of Dairy Science* 84 (2): 453-461, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: cows, lactating multiparous, Holstein, breed, free stall facility, animal performance, cornmeal, dry matter basis, total mixed ration, dry matter, Cornell Penn Miner Dairy(R) nutrition model, percentage and yield of fat, crude protein, true protein, lactose in milk, milk urea nitrogen.
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Keywords: cows, Holstein, breed, herb feeding, antioxidative activity in milk, hay, beef pulp, lemongrass, peppermint, basil, 6 Hydroxy 2,5,7,8 tetramethylchroman 2 carboxylic acid (HTCA).

- Uetake, K., K. Yayou, and T. Okamoto (1998). **Influence of feeding operation and social factors on cattle locomotion in free stall barns.** *Canadian Journal of Animal Science* 78(3): 421-424, ISSN: 0008-3984. NAL Call No.: 41.8 C163  
Keywords: dairy cattle, calves, feeding behavior, social behavior, motivation, social factors, locomotion, free stall, barns, housing, AG AB.
- Vaarst, M., M.B. Jensen, and A.M. Sandager (2001). **Behaviour of calves at introduction to nurse cows after the colostrum period.** *Applied Animal Behaviour Science* 73(1): 27-33, ISSN: 0168-1591. NAL Call No.: QL750.A6  
Keywords: calves, housing, single boxes, teat bucket, cow colostrum, behavior, abnormal behavior, social behavior, feeding, nurse cows, suckling.
- van der Merwe, B.J., T.J. Dugmore, and K.P. Walsh (2001). **The effect of monensin on milk production, milk urea nitrogen and body condition score of grazing dairy cows.** *South African Journal of Animal Science* 31 (1): 49-55, ISSN: 0375-1589. NAL Call No.: SF1 S6  
Keywords: dairy cows, Holstein-Friesian, breed, postpartum, monensin, pasture grazing, kikuyu pasture, maize-based concentrates, body condition scores, reproductive efficiency, dietary supplement, urea nitrogen, milk concentration, milk composition, milk production.
- van der Merwe, B.J., T.J. Dugmore, and K.P. Walsh (2001). **The effect of monensin on milk production, milk urea nitrogen and body condition score of grazing dairy cows.** *South African Journal of Animal Science* 31 (1): 49-55, ISSN: 0375-1589. NAL Call No.: SF1 S6  
Keywords: dairy cows, Holstein-Friesian, breed, postpartum, monensin, pasture grazing, kikuyu pasture, maize-based concentrates, body condition scores, reproductive efficiency, dietary supplement, urea nitrogen, milk concentration, milk composition, milk production.
- Veissier, I., A.R. Ramirez, and P. Pradel (1998). **Nonnutritive oral activities and stress responses of veal calves in relation to feeding and housing conditions.** *Applied Animal Behaviour Science* 57(1-2): 35-49, ISSN: 0168-1591. NAL Call No.: QL750 A6  
Abstract: This study assessed the extent to which eating solid foods and social contacts influence nibbling objects and improve the welfare of veal calves. Animals were fed milk replacer only vs. supplemented with solid foods and were housed in individual stalls vs. together in pens. Time budget, reactions to handling in a weighing machine, growth, health (length of medical treatments) and abomasal lesions were assessed. In addition, chronic activation of the hypothalamo--pituitary--adrenocortical axis was evaluated after ACTH and CRF challenges, and that of the sympathetic nervous system, through activities of catecholamine-synthesising enzymes. The provision of solid foods reduced time spent nibbling objects and being inactive in proportion to and at the time of the increase in time spent eating and chewing. The calves housed together in pens had higher basal cortisol levels and they reacted to weighing. Health and physiological indices of chronic stress did not vary with feeding or housing conditions. It is concluded that nibbling in veal calves derives at least in part from a lack of development of feeding behaviour appropriate to ruminants. There was no clear evidence of poorer welfare due to feeding on milk replacer only or individual housing, but calves reared in groups seemed more stressed by handling than calves reared in individual stalls.  
Keywords: oral activities, food, chewing, feeding behavior, milk replacer, social contacts, individual housing, group housing, stalls, pens, time budget, handling, growth, health, medical, treatments, lesions, sympathetic nervous system, stress response, enzymes, basal, cortisol, chronic stress conditions, development.
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Keywords: in vitro technique, evaluate, production, neutralization, acids, fermenting feed, rumen, substrate preferences, microbial populations, calcium, legumes, sugar beet pulp, citrus pulp.

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Keywords: available energy content of feeds, diet formulation, energy availability, net energy for lactation (NEL), total digestible nutrients (TDN) acid detergent fiber, mechanistic models, improved accuracy, review.

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NAL Call No.: SF854 I57 1998

Keywords: livestock, calves, piglets, weaning, veterinary education, trace elements, minerals, immune system, nutrition, animal health, reproduction, energy metabolism, animal husbandry, animal welfare, epidemiology, reproductive disorders, milk production, mammary glands, poultry, mastitis, mammary gland diseases, nutritional disorders, milk, dairy cows, farming, metabolic disorders, European Union countries.

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Keywords: colostrum intake, immunoglobulin, behavior.

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Keywords: lactating dairy cows, humid weather, feeding, diet, grain, feed intake, dry matter, milk yield, milk fat percentage, milk protein percentage, heat stress, environmental temperature, relative humidity, blood serum, rumen fluid, pH, respiration rate, body temperature, summer, Georgia.

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NAL Call No.: 49.9 N483

Keywords: hoof, health, rumen, digestive system, diseases, chronic ruminal acidosis, digestive system disease, metabolic disease, lameness, epidemiology, etiology, pathology, prevention and control, laminitis, bone disease, connective tissue disease, joint disease, endotoxins, histamine, lactic acid, nutrient detergent fiber, protein, degradation, serotonin, trace elements, inadequate uptake, nutrition, pH, fiber content, moisture content, New Zealand.

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Keywords: cows, energy status, plasma beta-hydroxybutyrate level, plasma glucose level, interval between calving, onset of cyclicity, conception, silage-based diet, dry period.

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Keywords: cows, Holstein, breed, fall calving, milk production, summer grazing, grass pasture, clover mixed, bovine somatotropin, concentrate supplements, dry matter, average daily milk.
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Keywords: feeding, system, automatic control, feed rations, lactation, social behavior.
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Keywords: cows, Holstein, breed, blood samples, milk samples, dry matter intake, lactation, milk production, linear increase, biotin supplementation, milk fat, protein percentages.

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## General

- Alban, L., A.K. Ersboll, T.W. Bennedsgaard, and P.F. Johnsen (2001). **Validation of welfare assessment methods at herd level: an example.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(Supplementum 30): 99-102, ISSN: 0906-4702.  
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Keywords: dairy herds, animal welfare, validity, assessment methods, environment based method, animal based method.
- Albright, J.L. (2000). **Dairy cattle behaviour, facilities, handling and husbandry.** In: *Livestock Handling and Transport*, 2nd ed. T. Grandin (ed.), CABI Publishing, Wallingford, UK, ISBN: 0-85-199409-1, p.127-150.  
NAL Call No.: SF88.L58 2000  
Keywords: handling, husbandry, behavior, housing, dairy cattle, social behavior, calves, bulls, transport of animals, animal welfare.
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Keywords: animal health, dairy farming, cows, reviews, animal welfare, transport of animals, exercise, tail docking, dehorning, disease, environmental issues.
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NAL Call No.: S605.5.B5

Abstract: Biological dairy farming is often advocated as a solution for environmental problems caused by Dutch dairy farming. At the same time, biological farming can improve animal welfare and increase income due to a higher milk price. In this paper the central issue is to quantify economic and environmental consequences for dairy farms when converting to biological dairy farming. A linear programming model is used to model an extensive and an intensive dairy farm typical for the Province of Utrecht, The Netherlands. The objective function of the model maximizes labour income of the farm. From the results it appears that the extensive farm benefits from conversion while the intensive farm loses income. The environmental consequences are quite diverse. The nitrogen surplus after conversion is much lower than before because nitrogen fixation by legumes is omitted from the calculation. On the other hand, ammonia emission is higher after conversion to biological farming due to a higher number of animals. On the extensive farm the phosphate surplus in the biological situation is much higher than in the conventional situation due to the fact that a shortage of nitrogen in the biological situation can only be made up by applying animal manure (slurry) from other farms with consequential overfertilization of phosphate. When environmental legislation is introduced, the biological farms appear to lose more income than the conventional farms. From the sensitivity analysis it appears that assumptions about milk yield per cow and milk price are crucial for the economic results of biological farms.

Keywords: dairy farming, organic farming, economic analysis, environmental impact, dairy farms, sustainability, animal welfare, milk, food prices, mathematical models, extensive husbandry, intensive husbandry, nitrogen fixation, nitrogen balance, ammonia, emission, phosphate, cattle slurry, milk yield, farm income.

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Keywords: breeding, dairy farming, dairy industry, dairy research, global marketing, genomics, technology, computers, forecasts, health, animal welfare, production costs.

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NAL Call No.: 41.8 Am3

Keywords: animal welfare, attitudes, farming American Farm Bureau Federation.

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Keywords: dairy industry, organic farming, animal welfare issues, stockmanship, training, housing and environment, lameness, machine milking, infectious diseases, mastitis, nutrition, fertility and

reproduction, handling facilities, calf and heifer rearing, mutilations, new technology, somatotropin, unwanted progeny, extended lactation, United Kingdom.

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Keywords: health, dairy farming, attitudes, veterinarians, animal welfare, New Zealand.

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NAL Call No.: 49 Z8

Keywords: milk production, farm management, dairy cattle, cows, dairy farms, dairy farming, production possibilities, milk, animal welfare, identification, health, prophylaxis, vaccination, Germany, German language.

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Keywords: new biotechnologies, overview, genetic manipulation, food animals, introduction to biotechnology, genomics, bioinformatics, gene mapping, cloning, genetically modified organisms, transgenic animals, potential impact on the beef, dairy and veterinary industries, regulatory responsibilities, future challenges.

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NAL Call No.: 49.9 N483

Keywords: dairy cows, farm expense, rice, grain crop, milk solids, financial analysis, butter, dairy product, cash surplus ration, fixed expenses, gross assets, turnover ratio, hay, animal feed, high interest expenditure, milk, dairy product, production, non-subsidized lone procurement, pasture grazing system,

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Keywords: animal welfare, dairy cattle.
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Keywords: dairy cows, animal welfare, lameness, bovine mastitis, intensive livestock farming, dairy farming, livestock numbers, selection criteria, farm structure, cow housing, floor type, literature reviews.
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Keywords: dairy farming, animal welfare, case studies, evaluation, regulations, agricultural policy, dairy farms, organic farming, ethology, immunology, European Union Countries.
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Keywords: dairy farming, milk production, animal welfare, costs, planning, Germany, German language.
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Keywords: milk yield, dairy cows, animal welfare, dairy farming, German language.
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Keywords: animal care, animal welfare, improvement.
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NAL Call No.: SF5.B74  
Keywords: dairy cows, genetic improvement, milk yield, cost benefit analysis, animal welfare, production costs, species differences, energy cost of activities, energy cost of production, beef cows, bovine mastitis, embryo transfer, lameness.
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Keywords: dystocia, reproductive system disease, mastitis, animal welfare issues, identification, body condition, calf disease, cleanliness, comfort, cubicle design, expert opinions, behavior, lameness, non-specific disease, nutrition, production, skin lesions, social interaction, stockperson, animal interactions, dystocia, mastitis.
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Keywords: animal welfare, veal calves, beef cattle, dairy cows, health, behavior, housing, milk production, transport of animals.
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Keywords: selection, behavior, breeding, reproduction, milking, milk handling, how a milking machine works, milk composition, quality, making dairy foods at home, feeding, calf rearing, health.

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## Health

- Aeberhard, K., R.M. Bruckmaier, U. Kuepfer, and J.W. Blum (2001). **Milk yield and composition, nutrition, body conformation traits, body condition scores, fertility and diseases in high-yielding dairy cows: Part 1.** *Journal of Veterinary Medicine. Series A* 48(2): 97-110, ISSN: 0931-184X.  
NAL Call No.: 41.8 Z5  
Keywords: dairy cows, high milk producing, feed intake, body conformation traits, body weight, body condition score, fertility, disease incidence, abortion, dyspepsia, hypocalcemia, incidence, lactation, live weight gain, mastitis, milk, milk composition, milk yield, ovarian cysts, type score, Switzerland.
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Keywords: milk production, quotas, milk distribution, milk marketing, exports, cows, animal welfare, milk hygiene, somatotropin, tuberculosis, bovine spongiform encephalopathy, United Kingdom.

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Keywords: milk production, milk marketing, quotas, farm income, dairy farms, milk processing, milk hygiene, bovine spongiform encephalopathy, animal welfare, somatotropin, tuberculosis, United Kingdom.

Alban, L. and J.F. Agger (1996). **Welfare in Danish dairy herds. 1. Disease management routines in 1983 and 1994**. *Acta Veterinaria Scandinavica* 37(1): 49-63, ISSN: 0044-605X.

Keywords: Dutch Animal Health Service, bovine herpesvirus 1 (BHV1), problems with vaccine batch, contamination with bovine virusdiarrhea virus (BVDV) type 2, monoclonal antibodies, cine farm visits, laboratory results, disease symptoms, high morbidity, decreased feed intake and milk production, nasal discharge, fever, diarrhea, necropsy, erosions and ulcers of the mucosa of the digestive tract, degeneration of the liver, hyperaemia of the abomasum, swollen mesenterial lymph nodes, swollen spleen.

Alban, L. (1996). **Assessing and managing welfare in a Danish dairy herd: problems and a proposal**. In: *Livestock Farming Systems: More than Food Production, Proceedings of the 4th International Symposium, Foulum, Denmark, August 22-23, 1996*, J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands p. 262-266, ISBN: 9-07-413449-1.

NAL Call No.: 49.9 Eu7 no.89

Keywords: dairy cattle, cow housing, animal welfare assessment, health, management, cattle diseases, foot diseases, clinical examinations, Denmark.

Alban, L. and J.F. Agger (1996). **Welfare in Danish dairy herds. 2. Housing systems and grazing procedures in 1983 and 1994**. *Acta Veterinaria Scandinavica* 37(1): 65-77, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: animal welfare, behavior, health, questionnaires, surveys, descriptive epidemiology, tie stall environments, lameness, feeding, pasture grazing, recommendations, partitions, cubicles, saw dust, resting area, housing systems.

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Keywords: beef cattle, dairy cattle, disease, bacterial, leptospira, seroprevalence, risk factors, herds, grazing, animal husbandry, livestock numbers, serotypes, Spain.

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Keywords: veterinary medicine, animal welfare, production, cattle diseases.

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NAL Call No.: 41.8 Am3

Keywords: salmonellosis, bacterial disease, biological characteristics, epidemiologic characteristics, food safety, public veterinary medicine, livestock production, serologic profiles.

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NAL Call No.: SF208 H43  
Keywords: nutrition, calf health, fertility, lameness, milk production, disease, building design, husbandry, economics, recordkeeping.
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NAL Call No.: 41.8 Am3  
Keywords: dairy calves, Holstein, breed, health, performance, *Mannheimia haemolytica*, *Pasteurella multocida*, vaccine, blood collection, antibody titers.
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NAL Call No.: SF95.A55  
Keywords: cows, Holstein, breed, ketosis, metabolic disease, calcium propionate, propylene glycol, beet pulp, ground corn, sugarcane molasses, dietary supplements, lactation, milk yield, tie stall housing.
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NAL Call No.: SF601.N4  
Keywords: Dutch Animal Health Service, bovine herpesvirus 1 (BHV1), problems with vaccine batch, contamination with bovine virus diarrhoea virus (BVDV) type 2, monoclonal antibodies, cine farm visits, laboratory results, disease symptoms, high morbidity, decreased feed intake and milk production, nasal discharge, fever, diarrhoea, necropsy, erosions and ulcers of the mucosa of the digestive tract, degeneration of the liver, hyperaemia of the abomasum, swollen mesenterial lymph nodes, swollen spleen.
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NAL Call No.: 41.8 Au72  
Keywords: docking, cows, dairy cows, husbandry, interviews, farmers, risk, leptospirosis, mastitis, bovine mastitis, milk quality, pain, milking, animal welfare, surveys, questionnaires.
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126 (6): 198-207, ISSN: 0040-7453.

NAL Call No.: 41.8 T43

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test-day milk yields were 932 kg greater for bST-treated cows. Pregnancy rates, days open, twinning, cystic ovaries, or abortions were unaffected by treatments. Supplementation of cows with bST had no effect on total mastitis cases, total days of mastitis, duration of mastitis, or the odds ratio of a cow to develop mastitis. Cows supplemented with bST used more medications for health events other than mastitis. This usage was associated primarily with treatments for disorders of the foot and hock. Supplemented cows had a slight increase in foot disorders. There was no effect of supplementation with bST on culling from the herd or removal from study. Overall, the results confirm that label directions for bST are adequate for safe use under field conditions. All clinical signs observed in this study occur normally in dairy herds and were managed in cows supplemented with bST.

Keywords: dairy herds, dairy cows, health, lactation, geographical variation, milk yield, pregnancy rate, open days, litter size, ovarian diseases, abortion, mastitis, duration, foot diseases, hocks, diseases, culling, cystic ovarian diseases.

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NAL Call No.: SF5 B74 no. 23

Keywords: heifers, housing, social behavior, animal welfare, legislation, stress, foot diseases, claws, United Kingdom.

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NAL Call No.: 41.8 V641

Keywords: dairy cattle, Holstein, breed, animal welfare, lameness, case reports, clinical aspects, dermatitis, digits, disease prevalence, prevention, correct trimming, adequate nutrition, hygiene, epidemiology, foot diseases, histopathology, lesions, medical treatment, oxytetracycline, Brazil.

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NAL Call No.: SF601.P7

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NAL Call No.: 41.8 T431

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NAL Call No.: SF810 V4

Keywords: Holstein heifers, field trial, treatment, sustained release ivermectin bolus, first lactation, milk production, milk composition, percent fat, protein, fecal samples, nematode egg excretion, average daily gain, total weight gain, IVOMEK(R) SR bolus.

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NAL Call No.: 41.8 P882.

Keywords: dairy cows, loose housing, cubicles, slatted floors, improper installation, design defects, feet, hooves, animal welfare, foot diseases, diseases, cattle diseases, Germany, German language.

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Keywords: tail docking, animal well being issue, fly season, comparison, docked versus nondocked cows, stage of lactation, physiological, immunological, behavioral measures, cows housed in a tie stall barn, blood samples, plasma and leukocyte separation, cleanliness scoring, fly avoidance behaviors, foot stomping.
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NAL Call No.: SF601 T7  
Keywords: newborn calves, breed, Holstein Friesian, dams vaccinated against haemorrhagic septicaemia (HS), transferred antibody levels, enzyme linked immunosorbent assays, IgG response, age of calf.

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Keywords: dairy cows, risk factors, herd production, estrus detection, efficiency, health.
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NAL Call No.: S3 A27  
Keywords: epidemiology, health, economics, herd health management, qualitative research, simulation, systems analysis, methodology, assessment, animal welfare.
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Keywords: dairy cattle, lameness, economic losses, milking.
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Keywords: animal welfare, cows, mastitis, lesions, immune response, lameness, somatotropin.
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NAL Call No.: 44.8 J822  
Abstract: Eight primiparous cows in midlactation were used to determine a method for the mammary biopsy of standing cows in full lactation. Cows were mildly sedated; therefore, preoperative feed withdrawal was not necessary. A core of secretory tissue (0.75 to 1 g) was extracted using a rotating stainless steel cannula with a retractable blade at the cutting edge. Postoperative recovery was rapid, taking only 15 min per cow, and the method was reliable and efficient. The presence of secretory tissue was verified by histology and in situ hybridization with alpha s1-casein and alpha-lactalbumin probes. The capsular end of the core contained more connective tissue, and the parenchyma showed heterogeneous expression of alpha s1-casein and alpha-lactalbumin. Despite some postoperative bleeding, milk yield and composition in the biopsied gland were affected only transiently. Yield recovered by 3.5 d after biopsy, and composition recovered by 6.5 d after biopsy. Yield and composition of milk from the control glands were not affected by the procedure. Biopsy sites healed rapidly and without infection. No clinical mastitis was observed in any of the biopsied cows throughout the remainder of the lactation.  
Keywords: dairy cows, biopsy, mammary tissue, lactation, preoperative care, surgical instruments, cannulae, histology, milk composition, milk yield, healing, messenger RNA, AlphaS1-casein, alpha-lactalbumin, animal welfare.
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NAL Call No.: QP251 R48  
Keywords: cows, dairy farms, incidence of retained placenta, effect on the reproductive performance, incidence of uterine infection, interval from parturition to first estrus, number of services/conception, body condition.

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NAL Call No.: 41.8 Am3  
Keywords: dairy cows, somatotropin, animal welfare, bovine mastitis, milk production.
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NAL Call No.: 44.8 J822  
Keywords: breed, Holstein-Friesian, logistic regression analysis, analytical method, milk yield, disease resistance, retained placenta, mastitis, milk fever, ketosis, displaced abomasum, ovarian cysts, claw diseases, milk yield correlation, Lower Saxony, Germany.
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NAL Call No.: 41.8 N81  
Keywords: cows, heifers, Norwegian dairy herd, case study, claw disorder, diagnosis, etiology, integumentary system disease, pathology, bacterial disease, prevention and control, therapy, corns, digital dermatitis, sole hemorrhage, oxytetracycline, antibacterial drug, antiinfective drug, wood tar copper sulfate, bactericide, disinfectant, fungicide, body scoring system, evaluation method, claw trimming, therapeutic method, Norway, Norwegian language.
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NAL Call No.: 49 B96  
Keywords: foot diseases, health, productivity, hooves, floors, animal welfare, dairy cattle, cows, Norwegian language, Sweden, Norway.
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NAL Call No.: 41.8 N81  
Keywords: cows, heifers, Norwegian dairy herd, case study, claw disorder, diagnosis, etiology, integumentary system disease, pathology, bacterial disease, prevention and control, therapy, corns, digital dermatitis, sole hemorrhage, oxytetracycline, antibacterial drug, antiinfective drug, wood tar copper sulfate, bactericide, disinfectant, fungicide, body scoring system, evaluation method, claw trimming, therapeutic method, Norway, Norwegian language.
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Keywords: animal welfare, coccidiosis, parasites, dairy cattle, homeopathy, organic farming.
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NAL Call No.: SF1.L5  
Keywords: dairy farming, farming systems, costs, economic analysis, hygiene, infectious diseases, disease control, dairy herds, parasites, pest control, heifers, calves, digestive disorders, metabolic disorders, reproductive disorders, movement disorders, dairy farms, intensive husbandry, France.

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NAL Call No.: SF1 L5  
Keywords: incidence of health disorders, dairy farms, France, clinical mastitis, locomotor disorders, digestive disorders, reproductive disorders, retained placenta, dystocia, milk fever, chronic metritis, somatic cell counts, size of the dairy unit, dairy specialization, breed differences in disorders.
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NAL Call No.: QL750.A6  
Keywords: dairy cows, lameness, susceptibility, social dominance.
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NAL Call No.: 41.8 R312  
Keywords: lameness, social behavior, housing, lesions, hooves, social dominance.
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NAL Call No.: 41.8 Am3  
Keywords: salmonella, serotypes, culling, slaughter, digesta, cecum, colon, geographical variation, seasonal variation, incidence, comparisons, USA.
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NAL Call No.: SF781 R4  
Keywords: dairy farms, disease control, efficiency, optimization, case studies, economic analysis, health, bovine somatotropin, feed composition, computerized data, costs, productivity, new technology, postpartum diseases, USA.
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NAL Call No.: 41.8 V643  
Keywords: lactating Holstein-Friesian cows, perforated teat wounds, suture patterns with or without low level laser therapy (LLLT), wound healing, laser Doppler flowmetry (LDF), tensiometry and hydroxyproline analysis, histopathological examination, invasiveness, pain.
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NAL Call No.: SF601.I4  
Keywords: calves, disease control, pneumonia, beef cattle, dairy cattle, disease transmission, colostral immunity, calf feeding, stress management, calf housing, viral diseases, vaccination, combined vaccines.
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NAL Call No.: 44.8 J822  
Keywords: dual-purpose cows, body condition score, ketosis, reproductive performance, housing, tie stall barns, nutrition, Norway.

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NAL Call No.: 44.8 M5933  
Keywords: clinical mastitis, economical losses, farmers, consumer risk, epidemiological analysis, Italian dairy herds, housing management, udder hygiene, milking machine characteristic, milking procedures, risk factors, month of the year, days in milk (DIM), parity number, control measures.
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NAL Call No.: SF601 P7  
Keywords: dairy cattle calves, *Theileria parva*, infections, liveweight gain, small farms, protozoal infections, symptoms, geographical variation, climatic factors, age differences, animal housing, feeding, pest control, morbidity, mortality, grazing, breeds, concentrates, milk, mineral nutrition, compensatory growth, Kenya.
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NAL Call No.: 23 V4892  
Keywords: dairy cattle, cow, breed, Friesian, Friesian-cross, channel fat, dewlap thickness, weight, mesenteric fat, omental fat, udder, weight, body composition, body condition score, body contours, dentition, emaciation, New Zealand.
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NAL Call No.: SF601 V535  
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NAL Call No.: SF757.8 A4  
Keywords: toxicology, blood and lymphatics, immune system, B-lymphocyte, T-lymphocyte, neutrophil, dysentery, digestive system disease, genetic damage, genetic disease, injury, infectious disease, infectious disease, leukosis, blood and lymphatic disease, osteosarcoma, bone disease, injury, neoplastic disease, radiation cataract, eye disease, injury, tuberculosis, bacterial disease, cesium-137, accumulation, mobile, radionuclide, transfer factor; heavy metal, mineral substance, nitrate, organic substance, pesticide, saponite, zeolite, ionizing radiation, radiologic method, toxicity, epizootic situation, forest, immune status, meat, meat, milk, dairy product; pest-swampy soil, radiation safety, stress factor, trophic chain, Europe.
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NAL Call No.: SF601 V44  
Keywords: cows, lactating, farms, suboptimal reproductive efficiency, blood samples, microscopic agglutination, *Leptospira interrogans* serogroups: Australis, Autumnalis, Ballum, Canicola, Grippotyphosa, Icterohaemorrhagiae, Louisiana, Pomona, Sejroe, Shermani and Tarassovi, Spain.
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Keywords: dairy cows, escherichia coli, disease prevalence, feces, slaughter, Victoria.

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NAL Call No.: SF779.5.A1B6  
Keywords: cows, herds, central nervous system, nervous system diseases, downer cows, non-ambulatory cows, beef cattle, beef herds, dairy cattle, dairy cows, dairy herds, injury, trauma, septicemia/toxemia, non-responsive milk fevers, parturient paresis, monitoring, surveillance, bovine spongiform encephalopathy, US cattle populations.
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Keywords: dairy cattle, animal welfare, pain, productivity, behavior, milking parlor, feeding behavior, ruminating, lying, standing.
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NAL Call No.: SF601.P7  
Keywords: dairy herds, disease, bacterial, listeria monocytogenes, animal husbandry, farm management, milking, disease prevention, microbial contamination, food contamination, risk factors, milking machines, milking parlors, escherichia coli, vaccines, food safety, New York.
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NAL Call No.: 44.8 J822  
Keywords: milking cows, heifers, commercial farms, biotin supplementation, incidence of visible lameness, locomotion assessment, sole ulcer, white line separation, digital dermatitis, interdigital necrobacillosis, United Kingdom.
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Keywords: cattle feeding, dairy cattle, fodder, organic farming, parturient paresis, pathogens, bacterial, fungal.
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NAL Call No.: S3 A27  
Keywords: genetic trend, clinical mastitis, Norwegian Cattle, mastitis resistance, average selection differential.
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NAL Call No.: SF761.Z4  
Keywords: dairy cows, mastitis, culling, lactation, incidence, heritability, health, duration, genetic variation estimation, variance components, Norway.
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ISSN: 0343-0200.

NAL Call No.: SF761 Z4

Keywords: dairy cattle, literature review, selection for mastitis resistance, breeding programs, data recording, model selection, breeding value estimation, somatic cell counts, Denmark, Finland, Norway.

Hernandez, J. and J.K. Shearer (2000). **Efficacy of oxytetracycline for treatment of papillomatous digital dermatitis lesions on various anatomic locations in dairy cows.** *Journal of the American Veterinary Medical Association* 216(8): 1288-1290, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: dairy cows, oxytetracycline, topical application, efficacy, dermatitis, feet, lesions, size, papilloma, pain.

Hernandez, J., J.K. Shearer, and J.B. Elliott (1999). **Comparison of topical application of oxytetracycline and four nonantibiotic solutions for treatment of papillomatous digital dermatitis in dairy cows.** *Journal of the American Veterinary Medical Association* 214(5): 688-690, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: dairy cows, oxytetracycline, topical application, solutions, copper, hydrogen peroxide, efficacy, treatment, dermatitis, pain, lesions.

Hernandez, J., J.K. Shearer, and D.W. Webb (2001). **Effect of lameness on the calving to conception interval in dairy cows.** *Journal of the American Veterinary Medical Association* 218 (10): 1611-1614, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: lactating dairy cows, lameness, reproductive performance, interval from calving to conception, number of breedings required per conception, foot rot, papillomatous digital dermatitis, claw lesions, multiple lesions.

Hernandez, J., C. Risco, and A. Donovan (2001). **Association between exposure to *Neospora caninum* and milk production in dairy cows.** *Journal of the American Veterinary Medical Association* 219 (5): 632-635, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: cows, Holstein, breed, exposure to *Neospora caninum*, milk production in dairy cows, seropositive or seronegative cows, kinetic ELISA, production data, decrease in milk production, economic loss.

Heuer, C., Y.H. Schukken, L.J. Jonker, J.I.D. Wilkinson, and J.P.T.M. Noordhuizen (2001). **Effect of monensin on blood ketone bodies, incidence and recurrence of disease and fertility in dairy cows.** *Journal of Dairy Science* 84 (5): 1085-1097, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: effect of monensin, milk production, health, reproduction, calving, clinical mastitis, intramammary infection, lameness, calving to conception intervals, endometritis, cystic ovarian disease.

Hillerton, J.E. (1998). **Mastitis treatment: a welfare issue.** *British Mastitis Conference 1998*, Axient Information Services: Crewe, UK, p. 3-8.

Keywords: mastitis, treatment, animal welfare, dairy cows, milk production, milk quality, economics, drug resistance, antibiotics, bovine mastitis, United Kingdom.

Hillerton, J.E. (1998). **Bovine spongiform encephalopathy: current status and possible impacts.** *Journal of Dairy Science* 81(11): 3042-3048, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: Bovine spongiform encephalopathy is an apparently new disease, first recognized in 1985, its pathological distinction was first reported in 1986. Bovine spongiform encephalopathy is a member of a group of transmissible encephalopathies that includes scrapie in sheep and Creutzfeldt-Jakob Disease in humans. Early indications of its epidemiology suggested that the disease was transmitted via cattle feed containing meat and bone meals from previously infected animals. The tissues most likely to contain

infectious agents were considered to be nervous tissues and offal and their inclusion in ruminant feed was banned in the United Kingdom in 1989, regulations were tightened in 1992. Subsequent diagnosis has indicated that this ban has been effective and that confirmed cases are predicted to decline from a peak in the United Kingdom of 37,490 in 1992, to 7417 actual cases in 1996, and then to virtual extinction in 2001. Subsequent culling of all nonproductive cattle more than 30 mo of age and culling of cohort animals of confirmed cases is likely to reduce the predicted numbers and times significantly. Current interest is in the means of transmission of bovine spongiform encephalopathy within species and possibly to humans. A new variant of Creutzfeldt-Jakob Disease, with 28 cases confirmed, is virtually certain to be bovine spongiform encephalopathy in humans. The outbreak of bovine spongiform encephalopathy has had major impacts on the United Kingdom dairy industry, including the loss of beef from dairy markets, the culling of more than 900,000 dairy bull calves, the removal of all cattle more than 30 mo of age from the human food chain, and now slaughter of cohort animals. Impacts on dairy marketing have yet to be properly assessed. Information and statistics for bovine spongiform encephalopathy can be found on the worldwide web at <http://www.maff.gov.uk/maffhome.html>

Keywords: cattle, bovine spongiform encephalopathy, Creutzfeldt-Jakob disease, amyloid, molecular conformation, epidemics, disease transmission, feed formulation, dairy industry, EU regulations.

Hirvonen, J., K. Eklund, A.M. Teppo, G. Huszenicza, M. Kulcsar, H. Saloniemi, and S. Pyorala (1999). **Acute phase response in dairy cows with experimentally induced *Escherichia coli* mastitis.** *Acta Veterinaria Scandinavica* 40(1): 35-46, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: acute, acute phase response, phase, response, induced, *Escherichia coli*, mastitis, bovine, acute phase proteins, haptoglobin, nitric oxide.

Hoeben, D., C. Burvenich, P.J. Eppard, J.C. Byatt, and D.L. Hard (1999). **Effect of bovine somatotropin on neutrophil functions and clinical symptoms during *Streptococcus uberis* mastitis.** *Journal of Dairy Science* 82(7): 1465-1481, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, bovine mastitis, *Streptococcus uberis*, experimental infections, insulin-like growth factor, somatotropin, blood plasma, neutrophils, chemiluminescence, heart rate, hydrocortisone, movement, surface antigens, leukocyte count, blood picture, alpha-lactalbumin.

Hoedemaker, M., B. Korff, B. Edler, M. Emmert, and E. Bleckmann (2001). **Dynamics of *Staphylococcus aureus* infections during vaccination with an autogenous bacterin in dairy cattle.** *Journal of Veterinary Medicine Series B*. 48 (5): 373-383.

NAL Call No.: 41.8 Z52

Keywords: vaccine against *Staphylococcus aureus*, mastitis, somatic cell count, subcutaneously administered, supramammary lymph nodes, quarter milk samples.

Hoglund, J., C. Svensson, and A. Hesse (2001). **A field survey on the status of internal parasites in calves on organic dairy farms in southwestern Sweden.** *Veterinary Parasitology* 99 (2): 113-128.

NAL Call No.: SF810 V4

Keywords: organic dairy herds, internal parasites, reduced productivity, first grazing season cattle, nematode infections, management practices, *Eimeria alabamensis* oocysts per gram of feces, pasture contamination, *Ostertagia ostertagi* infection, lungworm infection, dictyocaulosis, management practices, supplementary feeding, control of gastrointestinal parasites, Sweden.

Holloway, N.M., J.W. Tyler, J. Lakritz, S.L. Carlson, and J. Holle (2001). **Serum immunoglobulin G concentrations in calves fed fresh and frozen colostrum.** *Journal of the American Veterinary Medical Association* 219 (3): 357-359, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: neonatal calves, Holstein, breed, serum IgG concentrations, fresh versus frozen colostrum.

Hopster, H., J.T.N. van der Werf, J.H.F. Erkens, and H.J. Blokhuis (1999). **Effects of repeated jugular puncture on plasma cortisol concentrations in loose-housed dairy cows.** *Journal Animal Science*

77(3): 708-714, ISSN: 0021-8812.

NAL Call No.: 49 J82

**Abstract:** In three experiments, the effects of venipuncture on plasma cortisol concentrations were studied in loose-housed dairy cows. In Exp. 1, two blood samples were collected 18 min apart on three alternate days from 20 dairy cows for studying their adrenocortical response to a single venipuncture. To further evaluate the effect of cows anticipating venipuncture, in Exp. 2, 15 dairy cows were sequentially venipunctured once daily on 12 successive days in a randomized order in groups of five, starting 15 min apart. In Exp. 3, 10 primiparous cows were used on three alternate days to study habituation to serial sampling (i.e., collection of first blood samples by venipuncture, 15 min apart). In cows accustomed to handling, jugular puncture did not affect cortisol concentrations in plasma collected 18 min later. Average daily cortisol concentrations varied between 2.07 +/- .38 and 3.81 +/- .56 ng/mL in the first (t = 0) and between 1.43 +/- .15 and 2.61 +/- .72 ng/mL in the second (t = 18) blood samples. Likewise, when cows were sampled sequentially once a day, the order of sampling between and within groups did not influence (P > .05) plasma cortisol concentrations. In contrast, primiparous dairy cows that were less used to being handled showed an average increase in cortisol concentrations when five samples were collected by venipuncture 15 min apart. During successive sampling sessions, however, the cows did not decrease or increase plasma cortisol concentrations in response to repeated serial sampling at the group level (P > .05). Between individuals, the maximum effect of repeated venipuncture on cortisol concentrations (4.5 to 22.6 ng/mL), the time at which the effect reached its maximum (30 to 60 min), and the consistency of the response handling and to being restrained, baseline cortisol concentrations can be measured in single blood samples that are collected by jugular puncture within 1 min after first approaching the cow. When successive blood samples need to be collected within 15 to 20 min, jugular puncture may induce an increase in cortisol concentration, which seems to depend on the handling experience of the animals and on individual differences.

**Keywords:** dairy cows, handling, individual characteristics, remote sampling.

Hopster, H., J.T.N. van der Werf, and H.J. Blokhuis (1998). **Stress enhanced reduction in peripheral blood lymphocyte numbers in dairy cows during endotoxin-induced mastitis.** *Veterinary Immunology and Immunopathology* 66(1): 83-97, ISSN: 0165-2427.

NAL Call No.: SF757.2.V38

**Keywords:** dairy cows, lymphocytes, stress, endotoxins, mastitis, etiology, hydrocortisone, blood chemistry, lactation, defense mechanisms, body temperature, animal welfare, susceptibility, incidence, variation.

Hopster, H. and H.J. Blokhuis (1994). **Validation of a heart-rate monitor for measuring a stress response in dairy cows.** *Canadian Journal of Animal Science* 74(3): 465-474, ISSN: 0008-3984.

NAL Call No.: 41.8 C163

**Keywords:** heart rate, stress, treadmill, telemetry.

Houe, H., S. Ostergaard, T. Thilting-Hansen, R.J. Jorgensen, T. Larsen, and J.T. Sorensen, J.F. Agger, and J.Y. Blom (2001). **Milk fever and subclinical hypocalcaemia: an evaluation of parameters on incidence risk, diagnosis, risk factors and biological effects as input for a decision support system for disease control.** *Acta Vet Scand* 42(1):1-29.

NAL Call No.: 41.8 AC87

**Keywords:** milk fever, incidence, diagnosis, risk factors, subclinical hypocalcaemia, laboratory examinations, nutrition, cation-anion balance, calcium level, reproductive disorders, dystocia, uterine prolapse, retained placenta, metritis repeat breeding, ketosis, displaced abomasum, mastitis.

Hu, S., C. Concha, A. Johannisson, G. Meglia, K.P. Waller (2001). **Effect of subcutaneous injection of ginseng on cows with subclinical Staphylococcus aureus mastitis.** *Journal of Veterinary Medicine Series B* 48(7): 519-528, ISSN: 0931-1793.

NAL Call No.: 41.8 Z52

**Keywords:** cow, host, Staphylococcus aureus, bacterial disease, subclinical mastitis, immune system,

oxidative burst activity, Panax ginseng extract, medicinal plant, immune stimulator, adverse reactions, dosage, subcutaneous injection, innate immunity, somatic cell count (SCC).

Hughes, J.W., W.B. Faull, P.J. Cripps, and N.P. French (1997). **Environmental control of bovine lameness.** *Cattle Practice: Journal of the British Cattle Veterinary Association* 5(3): 235-246, ISSN: 0969-1251. NAL Call No.: SF961 C37

Keywords: dairy cattle, farm comparisons, cattle housing, lameness, cubicles, walking surfaces, wood peelings, tracks, lanes, straw yards, comfort, mastitis incidence, United Kingdom.

Hultgren, J. (2002). **Foot/leg and udder health in relation to housing changes in Swedish dairy herds.** *Preventive Veterinary Medicine* 53(3): 167-89, ISSN: 0167-5877.

Keywords: Swedish commercial dairy herds, disease incidence rate, farmers' data, housing comparisons, tie-stalls versus cubicles, management practices, foot/leg disorders, clinical mastitis, teat injuries, high milk somatic cell counts (MSCCs).

Hultgren, J. (2001). **Observational and experimental studies of the influence of housing factors on the behaviour and health of dairy cows.** *Acta Universitatis Agriculturae Sueciae: Veterinaria* (No. 104), Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences: Uppsala, Sweden, 25p, ISSN: 1401-6257.

Keywords: dairy cows, animal behavior, health, animal welfare, bovine mastitis, diseases, housing, cow trainers, culling, hygiene, floor type, foot diseases, ketosis, litter, loose housing, mastitis, mats, reproductive performance, slatted floors, tethered housing, Sweden.

Ilha, M.R.S., C.F. Riet, and C.S.L. Barros (2001). **Dysthermic syndrome (hyperthermia) in cattle associated with poisoning by *Claviceps purpurea*. [Síndrome distérmica (hipertermia) em bovinos associada a intoxicação por *Claviceps purpurea*.]** *Pesquisa Veterinária Brasileira* 21 (2): 81-86.

NAL Call No.: SF756.37 B7P5

Keywords: dairy cattle, outbreak of dysthermic syndrome (hyperthermia), poisoning, *Claviceps purpurea*, feed contamination, fungus, clinical signs, pyrexia, dull, rough and long hair coats, intense salivation, difficult respiration with open mouth, environmental temperature, necropsy findings, Brazil.

Ingvartsen, K.L. and J.B. Andersen (2000). **Integration of metabolism and intake regulation: a review focusing on periparturient animals.** *Journal of Dairy Science* 83(7): 1573-1597, ISSN: 0022-0302. NAL Call No.: 44.8 J822

Abstract: There has been great interest in dry matter intake regulation in lactating dairy cattle to enhance performance and improve animal health and welfare. Predicting voluntary dry matter intake (VDMI) is complex and influenced by numerous factors relating to the diet, management, housing, environment and the animal. The objective of this review is to identify and discuss important metabolic factors involved in the regulation of VDMI and their integration with metabolism. We have described the adaptations of intake and metabolism and discussed mechanisms of intake regulation. Furthermore we have reviewed selected metabolic signals involved in intake regulation. A substantial dip in VDMI is initiated in late pregnancy and continues into early lactation. This dip has traditionally been interpreted as caused by physical constraints, but this role is most likely overemphasized. The dip in intake coincides with changes in reproductive status, fat mass, and metabolic changes in support of lactation, and we have described metabolic signals that may play an equally important role in intake regulation. These signals include nutrients, metabolites, reproductive hormones, stress hormones, leptin, insulin, gut peptides, cytokines, and neuropeptides such as neuropeptide Y, galanin, and corticotrophin-releasing factor. The involvement of these signals in the periparturient dip in intake is discussed, and evidence supporting the integration of the regulation of intake and metabolism is presented. Still, much research is needed to clarify the complex regulation of VDMI in lactating dairy cows, particularly in the periparturient animal.

Keywords: lactating dairy cows, dry matter intake, performance, health, animal welfare, metabolic factors, changes in reproductive status, fat mass, nutrients, metabolites, reproductive hormones, stress hormones, leptin, insulin, gut peptides, cytokines, neuropeptides, neuropeptide Y, galanin, corticotrophin-releasing factor.

Institute of Food Science and Technology (1998). **Bovine Somatotropin (BST). News Release, June 11, 1998**, Institute of Food Science and Technology: London, UK, 16p.

Keywords: somatotropin, milk production, dairy cows, synthetic hormones, adverse effects, drug residues, meat hygiene, milk hygiene, bovine mastitis, human health, product labels, health, animal welfare, reviews.

Janosi, S., and G. Huszenicza (2001). **Role of drying off therapy of dairy cows in the control of mastitis. Review article. [A tejelo tehenek szarazraallitasi terapiajanak szerepe a togygyulladas elleni vedekezésben. Irodalmi attekintés.] Magyar Allatorvosok Lapja** 123(7): 11-416, ISSN: 0025-004X  
NAL Call No.: 41.8 V644

Keywords: mastitis, reproductive system disease, dry cow therapy, selective dry cow therapy, literature review, Hungarian language.

Janosi, S., F. Ratz G. Szigeti, M. Kulcsar, J. Kerényi, T. Lauko, F. Katona, and G. Huszenicza (2001). **Review of the microbiological, pathological, and clinical aspects of bovine mastitis caused by the alga *Prototheca zopfii*. The Veterinary Quarterly: Quarterly Journal of Veterinary Science** 23 (2): 58-61.  
NAL Call No.: SF601 V46

Keywords: high producing, machine milked dairy cows, mastitis, *P. zopfii* alga, resistant forms, poor management, economic loss, decreased milk quality and quantity, culling of infected animals, pathogen isolation and identification, clinical features, control, review.

Janosi, S., G. Szigeti, F. Ratz, T. Lauko, J. Kerényi, M. Tenk, F. Katona, A. Huszenicza, M. Kulcsar, and G. Huszenicza (2001). **Prototheca zopfii mastitis in dairy herds under continental climatic conditions. The Veterinary Quarterly: Quarterly Journal of Veterinary Science** 23 (2): 80-83, ISSN: 0165-2176.  
NAL Call No.: SF601.V46.

Keywords: dairy cows, prototheca zopfii, dairy herds, climatic factors, bovine mastitis, outbreaks, epidemics, hygiene, animal husbandry, risk factors, pathotypes, infections, lactation, inflammation, latent infections, milk yield, somatic cell count, histopathology, protothecosis, Hungary.

Johannesson, T., J.T. Sorensen, and L. Munksgaard (1997). **Production environment as a component in a welfare assessment system in dairy cattle herds. In: Livestock Farming Systems: More than Food Production. Proceedings of the 4th International Symposium, Foulum, Denmark, August 22-23, 1996**, J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands p. 251-255, ISSN: 9-07-413449-1.  
NAL Call No.: 49.9 Eu7 no.89

Keywords: cows, animal welfare assessment, herds, behavior, injuries.

Jong, S.K., S.K. Gong, H.K. Chung, and S.H. Dae (2001). **Dairy-cattle health in Gyeongnam, Korea. Preventive Veterinary Medicine** 52 (2): 163-169, ISSN: 0167-5877.  
NAL Call No.: SF601.P7

Keywords: dairy cattle, animal health, monitoring, disease prevalence, frequency, epidemiology, data collection, dairy herds, animal husbandry, livestock numbers, disease prevention, reproductive disorders, mastitis, parturition complications, gastrointestinal diseases, metabolic disorders, lameness, respiratory diseases, skin diseases, Korea Republic.

Jonsson, M.E., A. Aspan, E. Eriksson, and I. Vagsholm (2001). **Persistence of verocytotoxin producing Escherichia coli O157:H7 in calves kept on pasture and in calves kept indoors during the summer months in a Swedish dairy herd. International Journal of Food Microbiology** 66 (1/2): 55-61, ISSN: 0168-1605.  
NAL Call No.: QR115.I57

Abstract: In 1997, a Swedish dairy farm was implicated in a human case of verocytotoxigenic Escherichia coli (VTEC) infection. The bacterium was found in a faecal sample from the human case and in faecal samples from cattle on the farm. Subtyping with pulsed field gel electrophoresis (PFGE) showed that the isolates were identical. The farm was further studied to assess the occurrence and the epidemiology of the agent at the farm level. The objective of this part of the study presented here was to examine the persistence of VTEC O157:H7 in calves that were kept on pasture and indoors, respectively,

during the summer. Twelve calves in the herd, with one positive faecal sample each of VTEC O157:H7 in April 1999, were followed by faecal sampling during the summer months. Six calves were kept indoors and six were kept on pasture. Faecal samples from each calf were collected once a month on five occasions from April to September. Bacterial examination was performed with immunomagnetic separation (IMS) and cultivation on CT-SMAC. PCR was used to test for the presence of genes encoding for verocytotoxin (VT), intimin (eaeA), enterohemorrhagic E. coli-hemolysin (EHEC-Hly) and the flagellar antigen H7. PFGE was used for genotyping the isolates. The faecal samples from the calves kept on pasture were negative during the whole period. It is possible that the faecal samples had bacterial counts lower than the detection limits for our procedure, or that the faecal samples were free from the bacteria at the time of sampling. This suggests that calves on pasture may be less exposed to the bacteria or that they clear themselves. In the pen group, there were between one and six culture positive individuals per sampling occasion. One of the calves that was housed indoors was positive in faecal culture on four consecutive samplings.

Keywords: calves, escherichia coli, bacterial diseases, pastures, dairy farms, dairy herds, husbandry, pens, summer, Sweden.

Jorgensen, R.J., T. Hansen, M.L. Jensen, and H.T. Thilsing (2001). **Effect of oral drenching with zinc oxide or synthetic zeolite a on total blood calcium in dairy cows.** *Journal of Dairy Science* 84 (3): 609-613, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: cows, Danish Holstein, breed, late lactation, milked in the morning only, oral drenching with zeolite A and zinc oxide, total serum calcium, blood samples, daily fluctuations in blood calcium, hypocalcemia.

Kadarmideen, H.N., and J.E. Pryce (2001). **Genetic and economic relationships between somatic cell count and clinical mastitis and their use in selection for mastitis resistance in dairy cattle.** *Animal Science Pencaitland* 73 (1): 19-28.

Keywords: cows, Holstein, breed, clinical mastitis, somatic cell count, genetic and economic relationship of lactation average, genetic parameters, permanent environmental, residual and phenotypic correlations, selection for mastitis resistance, breeding goals, genetic resistance.

Kalis, C.H.J., J.W. Hesselink, H.W. Barkema, and M.T. Collins (2001). **Use of long-term vaccination with a killed vaccine to prevent fecal shedding of Mycobacterium avium subsp paratuberculosis in dairy herds.** *American Journal of Veterinary Research* 62 (2): 270-274, ISSN: 0002-9645.

NAL Call No.: 41.8 Am3A

Keywords: dairy cows, dairy herds, vaccination, inactivated vaccines, mycobacterium paratuberculosis, feces, shedding, disease prevention, efficacy, culture techniques, culling, cattle husbandry.

Kjaestad, H.P., and E. Simensen (2001). **Cubicle refusal and rearing accommodation as possible mastitis risk factors in cubicle-housed dairy heifers.** *Acta Veterinaria Scandinavica* 42 (1): 123-130, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: dairy cows, heifers, housing, cubicle refusal, sheds, animal wastes, bovine mastitis, calving, epidemiology, mastitis, pregnancy, regression analysis, risk factors, disease incidence, Norway.

Kobayashi, Y., M.J. Vandehaar, H.A. Tucker, B.K. Sharma, and M.C. Lucy (1999). **Expression of growth hormone receptor 1A messenger ribonucleic acid in liver of dairy cows during lactation and after administration of recombinant bovine somatotropin.** *Journal of Dairy Science* 82(9): 1910-1906, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: Holstein cows, mRNA, growth hormone receptor, physiology.

Koehler, H., H. Gyra, K. Zimmer, K.G. Draeger, B. Burkert, B. Lemser, D. Hausleithner, K. Cussler, W. Klawonn, and R.G. Hess (2001). **Immune reactions in cattle after immunization with a mycobacterium paratuberculosis vaccine and implications for the diagnosis of M. paratuberculosis**

**and *M. bovis* infections.** *Journal of Veterinary Medicine Series B* 48 (3): 185-195.

NAL Call No.: 41.8 Z52

Keywords: calves, immunization of with a live modified *Mycobacterium paratuberculosis* vaccine, humoral and cell mediated immune reactions, vaccine shedding, tuberculin skin test, diagnostic methods, antibody enzyme linked immunosorbent assay, interferon gamma test, polymerase chain reaction, interferon gamma production, humoral immunity.

Kossaibati, M.A., and R.J. Esslemont (1997). **The costs of production diseases in dairy herds in England.**

*Veterinary Journal* 154(1): 41-51, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Abstract: Economic losses due to common health problems in dairy cattle were investigated in 90 Friesian/Holstein herds (average size 152 cows), which calved in England during the 1992/1993 season with an average annual yield of about 6000 l per cow. By using only the direct costs of common production diseases and other health problems (mastitis, lameness, vulval discharge, treatments for oestrus-not-observed, retained foetal membranes, milk fever, twinning, calf mortality and aid at calving), the cost of ill health in a 100 cow herd with average rates of these problems (compared with target levels) was estimated at pound sterling 6300 per year. The costs ranged from pound sterling 1200 (average of the top 10%) to pound sterling 13600 (average of the worst 10% of the herds). The main losses were due to mastitis and lameness (38 and 27% of health cost, respectively).

Keywords: Friesian/Holstein herds, economic loss, health problems, mastitis, lameness, vulval discharge, treatments for estrus-not-observed, retained fetal membranes, milk fever, twinning, calf mortality, aid at calving, estimated costs, losses, animal welfare, indexes.

Krebs, S., J. Danuser, and G. Regula (2001). **Using a herd health monitoring system in the assessment of welfare.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(Supplementum 30): 78-81, ISSN: 0906-4702.

NAL Call No.: S3.A27

Keywords: cows, dairy farms, health, claws, herd improvement, joints (animal), monitoring, skin tests, trauma.

Kremer, W.D.J., J.P.T.M. Noordhuizen, and J.T. Weeda (2001). **Veterinary herd health consultancy on dairy farms: Guidelines for starters. [Veterinaire advisering van melkveebedrijven: Een leidraad voor starters.]** *Tijdschrift Voor Diergeneeskunde* 126 (13): 455-461.

NAL Call No.: 41.8 T431

Keywords: veterinary herd health and production management advisory programs, dairy farms, farmers, veterinarians, structured content, well planned activities, professional implementation.

Kristoffersen, S. (1999). **Focus on milk quality, health of cows and animal welfare. [Fokus på mælkekvalitet, kvaegsundhed og dyrevelfaerd.]** *Dansk Veterinaertidsskrift* 82(1): 16-17, ISSN: 0106-6854.

NAL Call No.: 41.9 D23

Keywords: milk quality, animal welfare, cows, milk, Denmark.

Krohn, C.C. (2001). **Effects of different suckling systems on milk production, udder health, reproduction, calf growth and some behavioural aspects in high producing dairy cows: a review.** *Applied Animal Behaviour Science* 72 (3): 271-280, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, calves, different suckling systems, industrial countries, milk production, udder health, reproduction, behavior, gain, health, suckling systems, long term suckling, short term suckling, colostrum period, restricted versus free suckling systems, suckling decreases the risk of mastitis, post partum interval.

Kronfeld, D.S. (2000). **Recombinant bovine somatotropin and animal welfare.** *Journal of the American Veterinary Medical Association* 216(11): 1719-1724, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: somatotropin, dairy cows, animal welfare, bovine mastitis, law, ethics, data analysis, epidemiology, policy.

Kronfeld, D.S. (1997). **Recombinant bovine somatotropin. Views on the ethics of communication and animal health.** [Rekombinant bovint somatotropin. Synpunkter pa informations-och djurhalsoetik.] *Svensk Veterinartidning* 49(4): 157-165, ISSN: 0346-2250.

NAL Call No.: 41.9 SV23

Keywords: dairy cows, adverse effects, bovine mastitis, somatotropin, milk production, milk yield, animal welfare, mastitis, Swedish.

Krukowski, H., M. Tietze, T. Majewski, and P. Rozanski (2001). **Survey of yeast mastitis in dairy herds of small type farms in the Lublin region, Poland.** *Mycopathologia* 150 (1): 5-7.

NAL Call No.: 450 M994

Keywords: cows, clinical and subclinical mastitis, isolate fungi, quarter milk, milk samples, blood agar, Mac Conkey agar, aesculin tallium acetate crystal violet blood agar, Sabouraud agar with chloramphenicol and gentamicin.

Kumar, H., S. Mahmood, and L.P. Singh (2001). **Treatment of placental retention with ecboic drugs and its effect on subsequent fertility in crossbred cows.** *Indian Journal of Animal Sciences* 71 (7): 654-657, ISSN: 0367-8318.

NAL Call No.: 41.8 IN22

Keywords: cows, fertility response, retained fetal membranes, ecboic drugs, intrauterine infusion, oriprim bolus, synotocinon, luprostriol, estradiol valerate, herbal drug, metrali, reproductive efficiency, interval from parturition to conception, number of services per conception.

Lam, T.J.G.M. (1999). **Gain more from the Chain Quality Milk programme. Paper work can be useful.** [Haal meer uit Keten Kwaliteit Melk. Papierwerk kan ook nuttig zijn.] *Veehouder en Dierenarts* 13(1): 26-27.

Keywords: dairy farms, milk processing, veterinary products, residues, milk, animal welfare, health, cows, milking, milking parlors, storage, cleaning, disinfection, contamination, dairy wastes, environmental impact, veterinarians, quality controls, milk quality, Netherlands, Dutch language.

LangRee, R. (1998). **The cow will let you know.** [Kua gir beskjed.] *Buskap* 50(1): 30-31.

NAL Call No.: 49 B96

Keywords: dairy cattle, behavior, animal welfare, health, cows.

Le Fevre, A.M., D.N. Logue, J.E. Offer, I. McKendrick, and G. Gettinby (2001). **Correlations of measurements of subclinical claw horn lesions in dairy cattle.** *The Veterinary Record: Journal of the British Veterinary Association* 148(5): 135-138, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: breed, Holstein-Friesian cows, foot diseases, claws, sole and white line lesions, severity score, measurement, distribution, calving.

Leach, K.A., D.N. Logue, J.M. Randall, and S.A. Kempson (1998). **Claw lesions in dairy cattle: methods for assessment of sole and white line lesions.** *The Veterinary Journal* 155(1): 91-102, ISSN: 1090-0233.

NAL Call No.: SF601.V484

Abstract: Claw lesions are a major cause of lameness in dairy cattle. Analysis of the development of lesions is aided by numerical representation of their significance. Using data from observations on 31 heifers at 9 weeks post-calving, 5 lesion scoring methods were compared. These were: (1) number of lesions; (2) severity (3) adjusted severity; (4) size (measured by a novel technique involving image analysis of distal view photographs) and (5) size multiplied by adjusted severity (combined score). Relationships between scores for sole and white line lesions and between different claws within a cow were investigated. The small size but high clinical significance of severe lesions means that severity must be weighted if combined with size in a score. Sole and white line lesions showed a moderate but significant correlation in terms of severity but none in terms of size. The highest correlation between

scores for a single claw (the right hind outer) and the remaining claws was found for adjusted severity of sole lesions.

Keywords: heifers, claws, lesions, assessment, size, disease course, grading, hemorrhage, soles, image analysis.

Leach, K.A., D.N. Logue, S.A. Kempson, J.E. Offer, H.E. Ternent, and J.M. Randall (1997). **Claw lesions in dairy cattle: development of sole and white line haemorrhages during the first lactation.** *The Veterinary Journal* 154(3): 215-225, ISSN: 1090-0233.

NAL Call No.: SF601.V484

Keywords: heifers, lesions, foot diseases, soles, claws, hemorrhage, calving, lactation, disease, course, pathogenesis, AG AB.

LeJeune, J.T., T.E. Besser, N.L. Merrill, D.H. Rice, and D.D. Hancock (2001). **Livestock drinking water microbiology and the factors influencing the quality of drinking water offered to cattle.** *Journal of Dairy Science* 84 (8): 1856-1862, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: drinking water, microbial quality, cattle water troughs, coliform, *Escherichia coli* concentrations, proximity of the water trough to the feedbunk, increased contamination, protection of the trough from direct sunlight, concentrations of protozoa in the water, warm weather, Salmonella sp., shigatoxigenic *E. coli* O157, treatment with cycloheximide, increased persistence of *E. coli* O157.

Lende, T. van der, F.A.M. de Loos, and T. Jorna (2000). **Postnatal health and welfare of offspring conceived in vitro: a case for epidemiological studies.** *Theriogenology* 53(2): 549-554, ISSN: 0093-691X.

NAL Call No.: QP251.A1T5

Keywords: epidemiology, in vitro, animal experiments, blastocyst, dairy cattle, fertilization, in vitro culture, livestock, reproduction, culture, embryo transfer, animal welfare.

Leonard, N., J. Egan, J. Griffin, A. Hanlon, and D. Poole (2001). **A survey of some factors relevant to animal welfare on 249 dairy farms in the Republic of Ireland. Part 2: Data on incidence of disease, culling and biosecurity measures. Teagasc, Moorepark, Fermoy, Co. Cork, Irish Republic.** *Irish Veterinary Journal* 54(9): 454-456, ISSN: 0368-0762.

NAL Call No.: 41.8 IR4

Keywords: cows, culling, dairy farms, animal welfare, bovine mastitis, disease prevention, disease surveys, epidemiology, heifers, incidence, infertility, lameness, mastitis, mineral supplements, mortality, biosecurity, Irish Republic.

Leonard, F.C., J.M. O'Connell, and K.J. O'Farrell (1996). **Effect of overcrowding on claw health in first-calved Friesian heifers.** *British Veterinary Journal* 152(4): 459-472, ISSN: 0007-1935.

NAL Call No.: 41.8 V643.

Keywords: dairy cows, heifers lameness, foot diseases, overcrowding, behavior.

Lin, Y.L., C.C. Chou and T.M. Pan (2001). **Screening procedure from cattle feces and the prevalence of *Escherichia coli* O157:H7 in Taiwan dairy cattle.** *Journal of Microbiology Immunology and Infection* 34 (1): 17-24.

Keywords: screening *Escherichia coli* O157:H7, bovine feces, enrichment, selective culture, phenotyping, genotyping, culture, species confirmation, serotyping to O157 and H7, detection of verocytotoxin (VT) production, Taiwan.

Lischer, C.J., and P. Ossent (2001). **Bovine sole ulcer: a literature review. [Das Sohlengeschwür beim Rind: Eine Literaturübersicht.]** *Berliner und Munchener Tierärztliche Wochenschrift* 114(1-2):13-21, ISSN: 0005-9366.

NAL Call No.: 41.8 B45

Keywords: dairy cattle, sole ulcers, lameness, economic loss, animal wellbeing, corium, locus minoris, lesions, claw bone, tuberculum flexorium, healing process, epidemiological studies, German language.

- Koller, H. Geyer, C. Mulling, J. Schulze, and P. Ossent (2002). **Effect of therapeutic dietary biotin on the healing of uncomplicated sole ulcers in dairy cattle: a double blinded controlled study.** *Veterinary Journal* 163(1):51-60, ISSN: 0007-1935.  
NAL Call No.: 41.8 V643  
Keywords: dairy cows, sole ulcers, healing, biotin, orally administered, orthopedic shoe, histological examination, horn samples.
- Lischer, C.J., A. Dietrich-Hunkeler, H. Geyer, J. Schulze, and P. Ossent (2001). **Healing process of uncomplicated sole ulcers in dairy cows kept in tie stalls: clinical description and biochemical investigations. [Heilungsverlauf von unkomplizierten Sohlengeschwuren bei Milchkuhen in Anbindehaltung: Klinische Beschreibung und blutchemische Untersuchungen.]** *Schweizer Archiv fur Tierheilkunde* 143( 3 ):125-133, ISSN: 0036-7281.  
NAL Call No.: 41.8 SCH9  
Keywords: dairy cows, hoof health, lameness, scoring system, biotin, glucose, hematology, nutritional status, healing, horns, retinol, ulcers, German language.
- Logan K.E., M.J. Stear, B. McGuirk, D.J. Platt, and J.L. Fitzpatrick (1998). **Immunological responses of Holstein Friesian cattle to *Staphylococcus aureus*.** *British Mastitis Conference 1998*, Axient Information Services: Crewe, UK, p. 93.  
Keywords: immunology, immune response, bovine mastitis, mastitis, economics, animal welfare, somatic cell count, latent infections, bulls, genetic markers, Holstein-Friesian, dairy cows, United Kingdom.
- Logue, D.N. and J.E. Offer (2001). **The effect of forage type on foot health in dairy heifers.** *Veterinary Journal* 162 (1): 7-8, ISSN: 1090-0233.  
NAL Call No.: SF601.V484  
Keywords: heifer, claw horn lesions, injury, diet; foot health, forage type, lameness.
- Logue, D.N., J.E. Offer, K. Leach, S.A. Chaplin, A. le Fevre, and R. Berry (2001). **Cattle lameness and the welfare of the dairy cow.** *Research in Veterinary Science* 70(Supplement A): 35, ISSN: 0034-5288.  
NAL Call No.: 41.8 R312  
Keywords: animal welfare, housing, cubicle, comfort, lameness, risk factors, nutrition, pre-calving cubicle exposure.
- Logue, D.N. (1999). **A veterinary perspective on the development of a farm assurance scheme in Scotland: lessons for the national scheme?** *Cattle Practice: Journal of the British Cattle Veterinary Association* 7(4): 369-370, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: animal welfare, farm management, farm sector, animal production, legislation, hygiene, cattle housing, health, transport of animals, record keeping, Scotland.
- Logue, D.N., R.J. Berry, J.E. Offer, et al. (1999). **Consequences of "metabolic load" for lameness and disease.** *Cattle Practice: Journal of the British Cattle Veterinary Association.* 7(1): 113, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: metabolic disorders, lameness, animal diseases, health, animal welfare, dairy cows, behavior.
- Logue, D.N., McNulty, D., and A.M. Nolan (1998). **Lameness in the dairy cow: pain and welfare.** *Veterinary Journal* 156(1): 5-6, ISSN: 0007-1935.  
NAL Call No.: 41.8 V643  
Keywords: dairy cattle, lameness, cows, pain, animal welfare, experimental design.
- Logue, D.N. (1997). **Productivity, management and disease in dairy cattle.** *Bovine Practitioner* 31(2): 51-55, ISSN: 0524-1685.  
NAL Call No.: SF779.5.A1B6

Keywords: dairy cattle, infertility, mastitis, lameness, animal welfare, behavior, management, cost benefit analysis, etiology, milk production, production, cattle diseases.

Logue, D.N., J.E. Offer, and J.J. Hyslop (1994). **Relationship of diet, hoof type and locomotion score with lesions of the sole and white line in dairy cattle.** *Animal Production* 59(2): 173-181, ISSN: 0003-3561. NAL Call No.: 49 AN55

Keywords: breed, Jersey, Holstein-Friesian, diet, hoof angle, locomotion, milk yield, pathogenesis, foot diseases, diet, composition.

Loneragan, G.H., D.A. Dargatz, P.S. Morley, and M.A. Smith(2001). **Trends in mortality ratios among cattle in US feedlots.** *Journal of the American Veterinary Medical Association* 219(8): 1122-1127, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: dairy cattle, beef cattle, feedlot, mortality, epidemiology, respiratory tract disorders, USA.

Luepping, W. (2001). **Monitoring of feeding situation and health with physiologically based parameters. [Fuetterungs- und Gesundheitsmonitoring mit physiologischen Parametern.]** *Zuechtungskunde* 73(6): 460-470, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: dairy cow, Holstein, breed, bilirubin, calcium, glutamate dehydrogenase, phosphorus, protein, selenium, urea, feed, fiber content, roughage content, starch content, health monitoring, lactation curve, milk, dairy product, milk production, net acid-base excretion, German language.

Mahmoudzade, A.R., M Tarahomi, and H. Fotoohi (2001). **Effect of abnormal vaginal discharge at oestrus on conception rate after artificial insemination in cows.** *Animal Science Pencaitland* 72 (3): 535-538.

Keywords: cows, heifers, Holstein Friesian, breed, estrus, visual characteristics of the cervical mucous discharge, cervical mucus with urine, cervical mucus with microbes, cervical mucus with blood, no cervical mucus, artificial insemination, conception rate.

Maloo, S.H., W. Thorpe, G. Kioo, P. Ngumi, G.J. Rowlands, and B.D. Perry (2001). **Seroprevalences of vector-transmitted infections of small-holder dairy cattle in coastal Kenya.** *Preventive Veterinary Medicine* 52 (1): 1-16, ISSN: 0167-5877.

NAL Call No.: SF601.P7

Keywords: Zebu, breed, small farms, seroprevalence, pests, protozoa, anaplasma marginale, babesia bigemina, theileria parva, vector-borne diseases, risk factors, animal husbandry, crop management, surveys, elisa, hematocrit, metastigmata, pest control, Kenya.

Manske, T., J. Hultgren, and C. Bergsten (2002). **Topical treatment of digital dermatitis associated with severe heel-horn erosion in a Swedish dairy herd.** *Preventive Veterinary Medicine* 53(3): 215-31, ISSN: 0167-5877.

NAL Call No.: SF601.P7

Keywords: cows, breed, Swedish Red and White, Swedish Holstein, commercial dairy herd, foot health, topical treatments, digital dermatitis, severe heel-horn erosion, treatment, glutaraldehyde, oxytetracycline, foot trimming, cleansing, alone, grazing season, footbath twice daily after milking copper solution.

Martini, A., P. Tambini, M. Miccinesi, F. Ambrosini, A. Giorgetti, D. Rondina, R. Bozzi, C. Sargentini, and M. Moretti (2001). **Utilisation of homeopathy in dairy cattle: first results of an Italian trial.** In: *Human Animal Relationship: Stockmanship and Housing in Organic Livestock Systems. Proceedings of the Third NAHWOA Workshop, Clermont-ferrand, France, 21-24 October 2000*, M. Hovi and M. Bouilhol, eds., pp.119-124, Network for Animal Health and Welfare in Organic Agriculture, University of Reading: Reading, UK, ISBN: 0-7049-1094-2.

Keywords: cattle diseases, dairy cattle, homeopathy, legislation, organic farming, Italy.

- Mele, M., P. Secchiari, A. Serra, G. Ferruzzi, F. Paoletti, and M. Biagioni (2001). **Application of the Atracking signal@ method to the monitoring of udder health and oestrus in dairy cows.** *Livestock Production Science* 72(3): 279-284, ISSN: 0301-6226.  
NAL Call No.: SF1 L5  
Keywords: dairy cows, models, simulations, computational biology, udder health, reproductive system tracking signal method, monitoring method, estrus, milk electrical conductivity, moving average model, mastitis.
- Metz, J. H. M., E. Maltz, T.T. Mottram (1999). **Monitoring health and welfare in practice.** *Cattle Practice: Journal of the British Cattle Veterinary Association* 7(1): 123, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: health, animal welfare, diagnosis, cows, milking, mastitis, dairy herds, milk yield.
- Meyer, W., and H. Georg (2001). **Influence of floor design on the claw health of dairy cows. [Einfluss der Laufflächengestaltung auf die Klauengesundheit von Milchkuhen.]** *Landtechnik* 56(4): 258-259, ISSN: 0023-8082.  
NAL Call No.: 58.8 L235  
Keywords: dairy cows, cow housing, floors, slatted, mats, chopped straw, unclean surfaces, claws, foot diseases, hooves, infection, German language.
- Miettinen, P.V. (1995). **Prevention of bovine ketosis with glucogenic substance and its effect on fertility in Finnish dairy cows.** *Berliner und Munchener Tierarztliche Wochenschrift* 108(1): 14-19, ISSN: 0005-9366.  
NAL Call No.: 41.8 B45  
Keywords: negative energy balance, propylene glycol, nicotinic amide solution, post partum, acetone content in milk, fertility, milk yield, fat and protein.
- Mill, J.M., and W.R. Ward (1994). **Lameness in dairy cows and farmers' knowledge, training and awareness.** *Veterinary Record: Journal of the British Veterinary Association* 134(7): 162-164, ISSN: 0042-4900.  
NAL Call No.: 41.8 V641  
Keywords: animal welfare, economics, knowledge, training of farmers, England.
- Moore, D.A., S.L Berry, M.L. Truscott, and V. Koziy (2001). **Efficacy of a nonantimicrobial cream administered topically for treatment of digital dermatitis in dairy cattle.** *Journal of the American Veterinary Medical Association* 219 (10): 1435-1438, ISSN: 0003-1488.  
NAL Call No.: 41.8 Am3  
Keywords: dairy cows; Holstein, breed, drug therapy; interdigital dermatitis; pain scores, lesion activity, lesion size, pharmacology; lincomycin paste, potency; treatment; veterinary products.
- Morales, E., F.J. Trigo, F. Ibarra, E. Puente, and M. Santacruz (2001). **Neosporosis in mexican dairy herds: lesions and immunohistochemical detection of *Neospora caninum* in fetuses.** *Journal of Comparative Pathology* 125 (1): 58-63.  
NAL Call No.: 41.8 J82  
Keywords: dairy herds, aborted bovine fetuses, microscopical lesions, lymphocytic myocarditis microgliosis multifocal necrosis in the brain, lymphocytic hepatitis, lymphocytic myositis, immunohistochemical examination, brain, myocardium, liver, Mexico.
- Morrow, C.J., E.S., Kolver, K.A. Macdonald, G.A. Verkerk, and L.R. Matthews (2001). **Monitoring adrenal activity in dairy cows under various feeding regimens using faecal glucocorticoid metabolites.** *Proceedings of the New Zealand Society of Animal Production* 61: 52-55, ISSN: 0370-2731.  
NAL Call No.: 49.9 N483  
Keywords: dairy cows, Holstein Friesian, breed, adrenal activity, plasma glucocorticoid concentrations, fecal glucocorticoid concentrations, feeding, pastoral conditions, concentrate based, genotype effects, stocking rates, stress.

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NAL Call No.: 49.9 N483  
Keywords: cows, blood sampling, stress, measures, haptoglobins, magnesium, blood specimen collection, stress analysis.
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NAL Call No.: 41.8 R3224  
Keywords: bulls, evaluation, pain, heart rate, electroejaculation, animal welfare, anaesthesia, lidocaine, xylazine, heart rate, semen collection.
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NAL Call No.: 389.8 Z33  
Keywords: Vitamin E, cortisol, white blood cell count, surgery, stress, alpha-tocopherol, hydrocortisone, leukocytes, intramuscular injection, liver, blood plasma, sequential sampling, vitamin supplements.
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Keywords: hoof epidermis, nutrition, horn quality, keratinization, cornification, bovine hoof epidermis, lipids, minerals, calcium, vitamins, biotin, dyskeratotic, light and transmission electron microscopy, histochemical and enzyme-histochemical techniques.
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NAL Call No.: 41.8 C163  
Keywords: dairy cows, stress, ACTH, GH-release.
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NAL Call No.: 44.8 J823  
Keywords: cows, Sahiwal Friesian, breed, susceptible to lactation failure, milk yield, post partum, acetyl CoA carboxylase, fatty acid synthetase galactosyltransferase, key enzyme markers of cellular differentiation, failure of milk removal, impaired milk ejection reflex, Malaysia.
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NAL Call No.: 41.8 Am3  
Keywords: dairy calves, antibiotic residues, benzylpenicillin, kidneys, liver, milk, oral administration.
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NAL Call No.: SF779.5 A1B6  
Keywords: cows, laminitis lesions, cull rate, foot and leg problems, reproduction, mastitis, low production, New York dairy herds, United States.
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NAL Call No.: 44.8 J822

Keywords: dairy cows, staphylococcus aureus, bovine mastitis, dry period, antibiotics, experimental infections, lactation, application methods, secretions, somatic cell count, drug therapy, efficacy, antibiotic residues.

Nickerson, S.C., W.E. Owens, G.M. Tomita, and P.W. Widel (1999). **Vaccinating dairy heifers with a *Staphylococcus aureus* bacterin reduces mastitis at calving.** *Large Animal Practice* 20(3): 16, 18-19, 28, ISSN: 1092-7603.

NAL Call No.: SF601.B6

Keywords: heifers, *Staphylococcus aureus*, vaccination, mastitis.

Nicoletti, J.L.M. de, F.A.A. de Souza, A. Thomassian, C.A. Hussni, and A.L.G. Alves (2001). **Feet lesions and lameness prevalence in dairy cows kept in permanent confinement (free-stall and tie-stall). [Prevalencia de lesões podais e graus de claudicação em vacas leiteiras mantidas em confinamento permanente ("free-stall" e "tie-stall").]** *Revista de Educação Continuada do CRMV-SP* 4 (2): 24-32, ISSN: 1516-3326.

Keywords: dairy cows, age differences, number of parturitions, housing, tie-stall, free stall, disease prevalence, foot diseases, lameness, lesions, sole bleeding, white line disease, heel erosion, double sole, interdigital dermatitis, hoof cracks, Portuguese language, Sao Paulo farms.

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NAL Call No.: SF961 C37

Keywords: stress, metabolic disorders, animal welfare, dairy cows, dairy farming.

Noordhuizen, J.P., and G.H. Wentink (2001). **Developments in veterinary herd health programmes on dairy farms: a review.** *The Veterinary Quarterly: Quarterly Journal of Veterinary Science* 23(4): 162-9, ISSN: 0165-2176.

NAL Call No.: SF601.V46

Keywords: dairy farms, herd health, production management programs, epidemiology, quality assurance.

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NAL Call No.: 41.8 T431

Keywords: cows, metabolism, animal breeding, reproduction, legislation, regulations, animal welfare, bovine mastitis, somatotropin, administration, marketing, public health, biotechnology, cattle diseases Europe, Dutch language.

Norgaard, N.H., K.M. Lind, and J.F. Agger (1999). **Cointegration analysis used in a study of dairy-cow mortality.** *Preventive Veterinary Medicine* 42(2): 98-119, ISSN: 0167-5877.

NAL Call No.: SF601.P7

Keywords: dairy cows, mortality, statistical analysis, intensive husbandry, livestock farming, market competition, costs, animal welfare, stress, health, diseases, epidemiology, concentrates, feed intake, growth rate, herds, assets, livestock numbers, milk yield, Norwegian language.

O'Brien, C.N., A.J. Guidry, L.W. Douglass, and D.C. Westhoff (2001). **Immunization with *Staphylococcus aureus* lysate incorporated into microspheres.** *Journal of Dairy Science* 84 (8): 1791-1799, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: antibiotics, *Staphylococcus aureus*, resistant strains, scar tissue formation, blockage of ducts, inflammation, macrophages, mammary gland, treatments, lysate in NaCl, lysate in Freund's incomplete adjuvant (FICA), lysate in microspheres in NaCl, lysate in microspheres in FICA, antibody response.

Offer, J.E., D.N. Logue, and D.J. Roberts (1997). **The effect of protein source on lameness and solear lesion formation in dairy cattle.** *Animal Science: An International Journal of Fundamental and Applied Research*. 65(Part 2): 143-149, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: breed, Holstein-Friesian, protein sources, dietary protein, soybean oilmeal, complete feeds, lameness, laminitis, fish meal, blood meal, hooves, meat and bone meal, milk yield, body weight, liveweight gain, body condition, hardness, foot diseases, blood composition, metabolites.

Offer, J.E., D. McNulty, and D.N., Logue (2000). **Observations of lameness, hoof conformation and development of lesions in dairy cattle over four lactations.** *The Veterinary Record: Journal of the British Veterinary Association* 147(4): 105-109, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: dairy cows, lameness, claws, conformation, lesions, incidence, lactation, productive life, locomotion, calving.

Oikawa, S. and N. Katoh (2002). **Decreases in serum apolipoprotein B-100 and A-I concentrations in cows with milk fever and downer cows.** *Canadian Journal of Veterinary Research* 66(1): 31-34, ISSN: 0830-9000.

NAL Call No.: SF601 C24

Keywords: cows, milk fever, peripartum period, fatty liver, non-esterified fatty acids (NEFA), hepatic lipidosis, serum levels, apolipoprotein (apo) B-100, apoA-I, downer cow syndrome.

Oliver, S.P., B.E. Gillespie, M.J. Lewis, S.J. Ivey, R.A. Almeida, D.A. Luther, D.L. Johnson, K.C. Lamar, Moorehead, and H.H. Dowlen (2001). **Efficacy of a new premilking teat disinfectant containing a phenolic h d combination for the prevention of mastitis.** *Journal of Dairy Science* 84 (6): 1545-1549, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: premilking, teat disinfectant, phenolic combination, prevention, intramammary infection, split udder experimental design, clinical mastitis, *Streptococcus uberis*, *Streptococcus dysgalactiae*.

Olsson, I.M., S. Jonsson, and A. Oskarsson (2001). **Cadmium and zinc in kidney, liver, muscle and mammary tissue from dairy cows in conventional and organic farming.** *Journal of Environmental Monitoring* 3 (5): 531-538, ISSN: 1464-0325.

Keywords: cows, kidneys, liver, mammary tissue, organic farming, metallothionein, cadmium, zinc, tissue levels.

Oltenucu, P.A., Hultgren, J., and B. Algers (1998). **Associations between use of electric cow-trainers and clinical diseases, reproductive performance and culling in Swedish dairy cattle.** *Preventive Veterinary Medicine* 37(1/4): 77-90, ISSN: 0167-5877.

NAL Call No.: SF601.P7

Abstract: The role of electric cow-trainer technology as a risk factor for several diseases was evaluated. Diseases considered were retained placenta, metritis, ketosis, cystic ovaries, silent heat, milk fever, clinical mastitis, and foot and leg problems. Historical and contemporary controls (with control herds selected to match the experimental herds for size and location) were used. Data consisted of 10 264 Swedish Red and White (SRB) and 5461 Swedish Friesian (SLB) lactation records in 150 herds in Sweden, of which 33 used cow-trainers. Logistic regression was used to estimate the effects of parity and exposure to electric cow-trainers on the risks of diseases and the effects of diseases and exposure to electric cow-trainers on risk of culling. The dominant effects associated with use of electric cow-trainers were an increased risk for silent heat, clinical mastitis, ketosis and culling relative to cows in herds not using cow-trainers. Diseases had negative effects on reproductive performance and the effects were larger for cows in herds using cow-trainers. In herds using electric cow-trainers, the largest increase in the interval from first service to conception (58 days) was caused by the occurrences of silent heat, cystic ovaries and the combination of two or more diseases. Retained placenta, metritis, cystic ovaries, clinical mastitis and a combination of two or more diseases increased the risk of culling about two times relative to healthy primiparous cows with the increase being greater for cows in herds using cow-trainers. Silent heat did not increase risk of culling in control groups, but was the largest risk factor for culling in the exposed group. It is concluded that exposure to electric cow-trainers increased the incidence risk of silent heat, clinical mastitis, and ketosis and changed silent heat from a neutral disease with respect to culling

to a major risk factor. Finally, exposure to cow-trainers increased the general negative effect of diseases on the cows' reproductive performance and risk for culling.

Keywords: cow trainers, electrical equipment, placental retention, puerperal disorders, metabolic disorders, ketosis, lameness, culling, infertility, reproductive disorders, estrus, husbandry, animal welfare, Sweden.

Omer, M.K., E. Skjerve, Z. Woldehiwet, and G. Holstad (2001). **A cross-sectional study of bovine tuberculosis in dairy farms in Asmara, Eritrea.** *Tropical Animal Health and Production* 33(4): 295-303, ISSN: 0049-4747.

NAL Call No.: SF601.T7

Keywords: dairy cattle, tuberculosis, dairy farms, disease prevalence, risk factors, diagnosis, mathematical models, dairy breeds, risk assessment, livestock numbers, epidemiology, cattle housing.

Owens, W.E., S.C. Nickerson, R.L. Boddie, G.M. Tomita, and C.H. Ray (2001). **Prevalence of mastitis in dairy heifers and effectiveness of antibiotic therapy.** *Journal of Dairy Science* 84 (4): 814-817, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: heifers, *Staphylococcus aureus*, antibiotics, cephalosporin, penicillin novobiocin penicillin streptomycin, tilmicosin, cephalonium, dry cow products, not available in the United States.

Owens, W.E., S.C. Nickerson, and C.H. Ray (1999). **Efficacy of parenterally or intramammarily administered tilmicosin or ceftiofur against *Staphylococcus aureus* mastitis during lactation.** *Journal of Dairy Science* 82(3): 645-647, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, *Staphylococcus aureus*, mastitis, ceftiofur, antibiotics, application methods, efficacy, lactation, evaluation, dosage, duration, drugs, treatment, somatic cell count, bacteria, milk.

Owens, W.E., S.P. Oliver, B.E. Gillespie, C.H. Ray, and S.C. Mickerson (1998). **Role of horn flies (*Haematobia irritans*) in *Staphylococcus aureus*-induced mastitis in dairy heifers.** *American Journal of Veterinary Research* 59(9): 1122-1124, ISSN: 0002-9645.

NAL Call No.: 41.8 Am3A

Keywords: horn flies, mastitis, disease, health, production.

Paulino do L.E., P.A. Vaz, S. Ivanete, de F.V. Pedroso, and do L.L. Alberto (2001). **Effect of body condition score at calving on energy metabolism, milk yield and disease occurrence in postpartum of dairy cows. [Efeito da Condicao Corporal ao Parto sobre Alguns Parametros do Metabolismo Energetico, Producao de Leite e Incidencia de Doencas no Pos-Parto de Vacas Leiteiras.]** *Revista Brasileira de Zootecnia* 30(5): 1544-1549.

NAL Call No.: SF1 R45

Keywords: Holstein, calf, cow, body condition score, calving, disease occurrence, energy metabolism, milk production, fat content, blood beta-hydroxybutyrate (BHBA), aspartate-aminotransferase (AST) glucose, lactation, milk yield, parturition, Portuguese language.

Pavlata, L., A. Pechova, and J. Illek (2001). **Muscular dystrophy in dairy cows following a change in housing technology.** *Acta Veterinaria Brno* 70 (3): 269-275, ISSN: 0001-7213.<

NAL Call No: SF604 B7

Keywords: dairy cows, Bohemian Red Pied, breed, muscle tissue damage, muscular dystrophy, mineral deficiencies, potassium, selenium, stress, downer cows, transport of animals, change in housing, locomotor activity, deaspartate aminotransferase, creatine kinase, glutathione peroxidase, lactate dehydrogenase.

Phillips, C.J.C. and S.A. Schofield (1994). **The effect of cubicle and straw yard housing on the behaviour, production and hoof health of dairy cows.** *Animal Welfare* 3: 37-44, ISSN: 0962-7286.

NAL Call No.: HV4701.A557

Keywords: cattle housing, animal welfare, lameness.

- Phipps, A.M., L.R. Matthews, and G.A. Verkerk (1995). **Tail docked dairy cattle: fly induced behaviour and adrenal responsiveness to ACTH.** *Proceedings of the New Zealand Society of Animal Production* 55: 61-63, ISSN: 0370-2731.  
NAL Call No.: 49.9 N483  
Keywords: tail docking, flies, behavior, adrenal responsiveness to ACTH, production.
- Platz, S., F. Miller, and J. Unshelm (1999). **The impact of suboptimal husbandry practices on animal health and economic profitability - the example of tie-in versus loose housing system of dairy cattle. [Auswirkung von haltungsmangeln auf tiergesundheit und wirtschaftlichkeit am beispiel der anbinde- und laufstallhaltung von milchkuehen.]** *Berliner und Munchener Tierarztliche Wochenschrift* 112(12): 422-429, ISSN: 0005-9366.  
NAL Call No.: 41.8 B45  
Keywords: dairy cattle, housing, husbandry, loose housing, tethering, profitability, abnormalities, animal welfare, leukocyte count, checklists, cows, trauma, interviews, milk, milk yield, pregnancy, questionnaires, interviews, economics, qualifications of dairy stockmen, handling of animals, poor management, injury, number of inseminations per pregnancy, age of cow, cell count of milk, milk yield, German language.
- Pillai, S.R., E. Kunze, L.M. Sordillo, and B.M. Jayarao (2001). **Application of differential inflammatory cell count as a tool to monitor udder health.** *Journal of Dairy Science* 84 (6): 1413-1420, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: flow cytometric technique, differential inflammatory cell count, bovine peripheral blood leukocytes, quarter milk samples, mononuclear leukocyte count, polymorphonuclear leukocyte count, udder health status.
- Pocknee, B. (1998). **Quality milk production: meeting the challenge.** In: *British Mastitis Conference 1998*, Axient Information Services: Crewe, UK, p. 97-98.  
Keywords: economics, dairy farming, bovine mastitis, treatment, teat management, milking machines, animal welfare, milk production, milk production costs, quality standards, prevention, farm management, dairy farms, husbandry, udders, cow culling, United Kingdom.
- Polk, C. (2001). **Cows, ground surface potentials and earth resistivity.** *Bioelectromagnetics* 22(1): 7-18.  
Keywords: dairy farms, cows, stray voltage, step voltage, long term exposure, soil resistivity, health, milk production.
- Porfir'ev, I.A. (2001). **Metabolism disturbances in high productive milk cows during unsatisfactory conditions of feeding and keeping.** *Sel'Skokhozyaistvennaya Biologiya* 2: 20-40.  
Keywords: cows, high producing, Black and White, Kholmogorskaya, breeds, metabolic diseases, carbohydrate, lipid, protein, phosphorus calcium, vitamin A metabolisms, liver function, reproductive disorders.
- Prasad, H., R.K. Roychoudhury, and G. Patgiri (2001). **Incidence of subclinical mastitis at drying off.** *Indian Veterinary Journal* 78 (4): 316-318, ISSN: 0019-6479.  
NAL Call No.: 41.8 IN2  
Keywords: subclinical mastitis, per cent cow wise, per cent quarter wise, number of lactations.
- Rajan, G.H., C.A. Morris, V.R. Carruthers, R.J. Wilkins, and T.T. Wheeler (December 1996). **The relative abundance of a salivary protein, bSP30, is correlated with susceptibility to bloat in cattle herds selected for high or low bloat susceptibility.** *Animal Genetics* 27(6): 407-414, ISSN: 0268-9146.  
NAL Call No: QP98 A1A5  
Keywords: dairy cattle, pasture bloat, economics, animal welfare, salivary proteins, etiology of bloat, cattle grazed on legumes in New Zealand.

- Rankin, M. (1998). **An overview of nuisance flies on cattle.** *Cattle Practice: Journal of the British Cattle Veterinary Association* 6(1): 59-62, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: disease vectors, disease transmission, *Musca autumnalis*, *Hydrotaea irritans*, *Morellia simplex*, *Stomoxys calcitrans*, *Haematobia irritans*, *Haematopota pluvialis*, Chrysops, Simulium, Culicoides, biology and behavior of flies.
- Rasmussen, M.D, J.Y. Blom, L.A.H. Nielsen, and P. Justesen (2001). **Udder health of cows milked automatically.** *Livestock Production Science* 72(1-2): 147-156, ISSN: 0301-6226.  
NAL Call No.: SF1 L5  
Keywords: automatic milking, cull somatic cell count, new somatic cell count, old somatic cell count, dairy product, monthly cow cell count, new infections, udder health, Denmark.
- Reeves, V.B. (1995). **Liquid chromatographic procedure for the determination of novobiocin residues in bovine milk: interlaboratory study.** *Journal of AOAC International* 78(1): 55-58, ISSN: 1060-3271.  
NAL Call No.: S583 A7  
Keywords: treatment of mastitis in dairy cattle, novobiocin residues, tolerance, liquid chromatography.
- Rothbauer, D.L. (1994). **The relationship between production, stress, and the health of dairy cows.** *Veterinary Medicine* 89(12): 1164-1168.  
NAL Call No.: 41.8 M69  
Keywords: stress, nutrition, management, health, production, housing, handling.
- Ruegg, P.L. and L. Sekito (2004). Test characteristics and comparison of methods used to detect subclinical mastitis. *Annual Meeting National Mastitis Council*. 2004(43): 361-362, ISSN: 0271-9967.  
NAL Call No.: SF967.M3N32  
Keywords: dairy cows; bovine mastitis; disease detection; diagnostic techniques, asymptomatic infections, bulk milk; California mastitis test, mandatory screening, milk testing, somatic cell count.
- Rufenacht, J., P. Schaller, L. Audige, B. Knutti, U. Kupfer, and E. Peterhans (2001). **The effect of infection with bovine viral diarrhoea virus on the fertility of Swiss dairy cattle.** *Theriogenology* 56 (2): 199-210, ISSN: 0093-691X.  
NAL Call No.: QP251.A1T5  
Keywords: bovine viral diarrhoea virus, cattle pathogen, worldwide distribution, protective immunity, immunotolerance, viral invasion of fetuses, epidemiology, viral shedding, infection sources, increased rate of return to estrus, abortion, birth of calves with malformations, fetal deaths, gestation failures, management practices, Switzerland.
- Schreiner, D.A. and P.L. Ruegg (2002). **Effects of tail docking on milk quality and cow cleanliness.** *Journal of Dairy Science* 85 (10): 2503-2511, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Abstract: The objective of this study was to determine the effect of tail docking on somatic cell count (SCC), intramammary infection (IMI), and udder and leg cleanliness in commercial dairy herds. Lactating dairy cows (n = 1250) from eight Wisconsin farms were blocked by farm and randomly allocated to tail docked (D) or control (C) groups. Milk samples, somatic cell counts, and hygiene scores were collected for 8 to 9 mo. The prevalence of IMI was determined for each of the five occasions when milk samples were obtained. Udder and leg cleanliness were assessed during milk sample collection. Docked and control animals were compared by logSCC, prevalence of IMI, and leg and udder cleanliness score. Variables were analyzed according to all treatment, period, and farm interactions. At the end of the study period 76 (12.2%) and 81 (13%) of cows were culled in the D and C groups, respectively. There were no significant differences in the initial data for parity, daily milk yield, logSCC, or DIM between treatment groups. Effects significant to farms were identified for all variables over all periods. Period was significant for all variables except for the prevalence of environmental pathogens, but no period x treatment interactions were detected. There was no significant difference between treatment groups for somatic cell count. The prevalence of contagious, environmental, or minor

pathogens did not differ significantly between treatment groups. This study did not identify any differences in udder or leg hygiene or milk quality that could be attributed to tail docking.

Keywords: dairy cows, tail docking, somatic cell count, milk, hygiene, udders, legs, bovine mastitis, pathogens, contagious pathogens, environmental pathogens, stalls, Wisconsin.

Schreiner, D.A. and P.L. Ruegg (2003). **Relationship between udder and leg hygiene scores and subclinical mastitis.** *Journal of Dairy Science* 86(11): 3460-3465, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: bovine mastitis, dairy cattle, dairy herds, hygiene, legs, milk, somatic cell count, subclinical mastitis, etiology, prevention and control, husbandry, udders, standards, milk.

Schrack, F.N., M.E. Hockett, A.M. Saxton, M.J. Lewis, H.H. Dowlen, and S.P. Oliver (2001). **Influence of subclinical mastitis during early lactation on reproductive parameters.** *Journal of Dairy Science* 84(6): 1407-1412, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: cows, Jersey, breed, mastitis, subclinical, clinical, early lactation, reproductive performance, quarter foremilk samples, microbiological examination, services per conception, days open, days to first service, reproductive performance.

Schultz, C.E. (1999). **Detection of antibiotic residues in cull dairy cows at slaughter.** In: *Proceedings One Hundred and Third Annual Meeting of the United States Animal Health Association, San Diego, California, USA, October 7-14, 1999*, p. 277-293, United States Animal Health Association: Richmond, USA.

Keywords: antibiotics, cows, dairy cows, drug residues, antibiotic residues, meat inspection, meat hygiene.

Scott, P.R. (1996). **Lameness in dairy cattle.** *The British Veterinary Journal* 152(1): 11-12, ISSN: 0007-1935.

NAL Call No.: 41.8 V643

Keywords: dairy cattle, lameness, cattle husbandry, animal welfare.

Seimiya, Y.M., F. Kikuchi, N. Yamaguchi, K. Sugawara, and Y. Nakashima (2001). **Effective control of periparturient diseases in dairy cows owing to preparturient feed management practices.** *Animal Science Journal* 72(10): J587-J593, ISSN: 1344-3941.

NAL Call No.: SF1 A542

Keywords: cows, heifer, Holstein, breed, periparturient disease, prevention and control, reproductive system disease, preparturient feed management practices, high energy feeds, gestation, Japanese language.

Simon, K.H. (1997). **Health and fertility of dairy cows and veterinary service contracts for herd health care. [Gesundheit und Fruchtbarkeit von Milchkuhen, Service-Vertrag zur Bestandsüberwachung und Gesundheitsvorsorge.]** *Zuchtungskunde* 69(6): 464-470, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: veterinary practice, veterinary medicine, veterinary services dairy, herd medicine, fertility, health, animal welfare, farm management, herds, quality controls, dairy industry, dairy farms, contracts, quality standards, Germany, German language.

Singh, S.S., W.R. Ward, J.W. Hughes, K. Lautenbach, and R.D. Murray (1994). **Behaviour of dairy cows in a straw yard in relation to lameness.** *The Veterinary Record: Journal of the British Veterinary Association* 135(11): 251-253, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: housing, straw, lameness, behavior, handling, farmyards, rumination, diurnal variation, cattle housing.

Singh, S.S., W.R. Ward, K. Lautenbach, and R.D. Murray (1993). **Behaviour of lame and normal dairy cows in cubicles and in a straw yard.** *The Veterinary Record: Journal of the British Veterinary Association*

133(9): 204-208, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: behavior, housing, cubicles, straw, lameness, health, behavior, housing, cubicles.

Singh, S.S., R.D. Murray, and W.R. Ward (1992). **Histopathological and morphometric studies on the hooves of dairy and beef cattle in relation to overgrown sole and laminitis.** *Journal of Comparative Pathology* 107(3): 319-328, ISSN: 0021-9975.

NAL Call No.: 41.8 J82

Keywords: histopathology, outer hind claws, overgrown sole, wall epidermis, lameness in dairy cattle versus beef cattle.

Sischo, W.M., E.R. Atwill, L.E. Lanyon, and J. George (2000). **Cryptosporidia on dairy farms and the role these farms may have in contaminating surface water supplies in the northeastern United States.** *Preventive Veterinary Medicine* 43(4): 253-267.

NAL Call No.: SF601 P7

Keywords: dairy cattle, calves, dairy farms, water contamination, risk factors, surface waters, manure-management practices, on-farm water, stream samples, cryptosporidia shedding.

Sixt, A., C. Stanek and E. Mostl (1997). **Effect of different ways of trimming the claws of cows on plasma cortisol concentration. [Der Einfluss verschiedener Methoden der Klauenkorrektur auf den Plasmakortisolspiegel bei der Milchkuh.]** *Wiener Tierärztliche Monatsschrift* 84(7): 181-188, ISSN: 0043-535X.

NAL Call No.: 41.8 T345

Keywords: dairy cows, animal welfare, stress, restraint, hydrocortisone, claw trimming, German language.

Smith, B.P. (1997). **Down cows: causes and treatments.** *Proceedings of the Annual Conference of the American Association of Bovine Practitioners* (31): 43-45.

NAL Call No.: SF961.A5

Keywords: dairy cows, cattle diseases, paresis, prevention.

Spranger, J. (1998). **[Guidelines for prevention and therapy in ecological animal farms as in the example of bovine mastitis].** *DTW: Deutsche tierärztliche Wochenschrift* 105(8): 321-323, ISSN: 0341-6593.

NAL Call No.: 41.8 D482

Keywords: dairy cattle, mastitis, forbidden prophylactic use of antibiotics, restricted therapy antibiotics, systematic homeopathic prophylaxis, sanitation measures, false homeopathic medications, German language.

Stefanowska, J., D. Swierstra, C.R. Braam, and M.M.W.B. Hendriks (2001). **Cow behaviour on a new grooved floor in comparison with a slatted floor, taking claw health and floor properties into account.** *Applied Animal Behaviour Science* 71(2): 87-103, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, cow housing, floors, floor type, slatted floors, animal behavior, time, movement, claws, trauma, animal health, animal welfare, cattle dung, farm equipment, time budgets, floor walkability, manure scrapers.

Stehr, W., B. Twele, and L. Rosales (2001). **Use of recombinant somatotropin in dairy cows. [Uso de somatotrofina recombinante en vacas lecheras.]** *Archivos de Zootecnia* 50(191): 419-422, ISSN: 0004-0592.

NAL Call No.: 49 AR22

Keywords: lactose, recombinant somatotropin, total protein, milk fat, milk production.

Steinhardt, M. And H.H. Thielscher (2001). **Heart rate and diurnal rhythmicity in dairy calves at different ages.[Herzfrequenz und Tagesperiodik bei Milchrindkälbern während der Aufzucht am Traenkeautomaten.]** *Tieraerztliche Umschau* 56(8): 413-423, ISSN: 0049-3864.

NAL Call No.: 41.8 T445

Keywords: dairy cattle, German Holstein Friesian, German Red Pied, breed, calf age, 5, 15, 40 and 60 days of age, diurnal rhythmicity, heart rate, circadian rhythms, German language.

Stelwagen, K., D.C. van Espen, G.A. Verkerk, H.A. McFadden, and V.C. Farr (1998). **Elevated plasma cortisol reduces permeability of mammary tight junctions in the lactating bovine mammary epithelium.** *Journal of Endocrinology* 159: 173-178. ISSN: 0022-0795.

NAL Call No.: 448.8 J8293

Keywords: plasma cortisol, mammary tight junctions, lactation, milking.

Stelwagen, K., G.A. Verkerk, A.H. Phipps, and L.R. Matthews (1997). **Effect of cortisol on mammary tight junction (TJ) permeability in lactating dairy cows.** *Livestock Production Science* 50(1): 39-40, ISSN: 0343-0200.

NAL Call No.: SF761 Z4

Keywords: cortisol, permeability, mammary tight junction.

Stockdale, C.R.(2001). **Body condition at calving and the performance of dairy cows in early lactation under Australian conditions: a review.** *Australian Journal of Experimental Agriculture* 41(6): 823-839, ISSN: 0816-1089.

NAL Call No.: 23 Au792

Keywords: dairy cows, body condition, calving, performance, lactation, stress, nutritional state, pastures, grazing, energy intake, dietary protein, fiber, starch, feed supplements, crude protein, rumen digestion, protein digestibility, reproductive performance, milk composition, milk yield, literature reviews.

Stull, C.L., Payne, M.A., Berry, S.L., and P.J Hullinger (2002). **Evaluation of the scientific justification for tail docking in dairy cattle.** *Journal of the American Veterinary Medical Association* 220 (9): 1298-1303, ISSN: 0003-1488.

NAL Call No: 41.8 Am3

Keywords: dairy cattle, tail docking, pain, animal welfare, regulations, methodology, physiological functions, animal behavior, insect control, animal health, public health, literature reviews.

Thilsing, H.T., and R.J. Jorgensen (2001). **Hot topic: prevention of parturient paresis and subclinical hypocalcemia in dairy cows by zeolite a administration in the dry period.** *Journal of Dairy Science* 84 (3): 691-693, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dry cows, zeolite feed supplement, parturient calcium status, milk fever, calcium carbonate, drench, blood samples, serum calcium, subclinical hypocalcemia.

Thompson, R.C., R.M. Hopkins, and W.L. Homan (2000). **Nomenclature and genetic groupings of Giardia infecting mammals.** *Parasitology Today* 16(5): 210-213, ISSN: 0169-4758.

NAL Call No.: QL757 P374

Keywords: enteric parasite, zoonotic diseases, humans, dogs, dairy cattle, diarrhea in child-care centers, molecular characterization, morphologically of isolates, taxonomy.

Tucker, C.B., D. Fraser, and D.M. Weary (2001). **Tail docking dairy cattle: effects on cow cleanliness and udder health.** *Journal of Dairy Science* 84 (1): 84-87, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: To determine whether tail docking would influence cow cleanliness and udder health in a free-stall system, we monitored milking cows after half the animals in a herd were docked. A sample of 223 docked and 190 undocked cows (reducing to 169 and 105 over the study as cows were dried off) were monitored for 8 wk. Cow cleanliness was scored in two areas: along the spine, and the rump adjacent to the tail at 1, 2, 3, 5, and 8 wk after docking. Cleanliness was evaluated by counting squares that were soiled (0 to 14 on a 5- x 17.5-cm grid) and judging soiling severity on a scale from 0 (clean) to 3 (thickly caked). Udder cleanliness was scored with the same scale (0 to 3) and by counting the number of teats with debris on them. Udder health was assessed by measuring SCC of two milk samples and the

number of animals diagnosed as mastitic by the on-farm veterinarian. No treatment differences were found in four measures of cow cleanliness, two measures of udder cleanliness, or udder health. However, cow cleanliness did differ over time, and analysis of a subsample of cows illustrated individual differences in cleanliness.

Keywords: dairy cows, tail, docking, cow housing, stalls, hygiene, udders, somatic cell count, individual characteristics, machine milking, milkers, animal welfare.

UK, Agriculture Committee, House of Commons (1996). ***The UK Dairy Industry and the CAP Dairy Regime. Volume 2: Minutes of Evidence and Appendices*** HMSO Publications Centre: London, UK, 431 p., ISSN: 0-10-550236-7.

Keywords: milk production, milk marketing, quotas, farm income, dairy farms, milk processing, milk hygiene, bovine spongiform encephalopathy, animal welfare, somatotropin, tuberculosis, United Kingdom.

UK, Institute of Food Science and Technology (1998). ***Bovine Somatotropin (BST). Food Science and Technology Today*** 12(3): 169-176, ISSN: 0950-9623.

NAL Call No.: TX341 F664

Keywords: cows, somatotropin, somatic cell count milk quality, safety, risk, health, mastitis, somatic cell count, legislation, GATT, labelling, health, antibiotic residues, public health, food safety, milk production, United Kingdom, USA, Europe.

Vaarst, M. and C. Enevoldsen (1996). ***Claw disorders among dairy cows in organic and in deep bedded pack barn systems in Denmark.*** In: *Society for Veterinary Epidemiology and Preventive Medicine. Proceedings of a meeting held at the University of Glasgow, Glasgow, UK, March 27-29, 1996*, M.V. Thrusfield and E.A. Goodall (eds.), Society for Veterinary Epidemiology and Preventive Medicine: Roslin, UK, p.185-194, ISSN: 0-94-807324-1.

Keywords: dairy cows, housing, floors, litter, hooves, epidemiology, lameness, foot diseases, animal welfare, Denmark.

van Klink, E.G., W.G. de Ruyter, C.D. Sijpkens, P.W. van Ham (March 1995). **[Veterinary medicine and organic animal husbandry. III. Animal health in organic dairy farms].** *Tijdschrift voor Diergeneeskunde* 120(5): 144-146, ISSN: 0040-7453.

NAL Call No.: 41.8 T431

Keywords: organic farms versus conventional farms, stockmen, relationship with animals, disease prevention, selective medicine use, regulations, disease incidence, Dutch language.

van Schaik, G., M. Nielen, and A.A. Dijkhuizen (2001). ***Biosecurity on dairy farms: the economic benefits.*** In: *Proceedings of the Society for Veterinary Epidemiology and Preventive Medicine Noordwijkerhout, Netherlands March 28-30, 2001*, F.D. Menzies and S.W. J. Reid (eds.), Society for Veterinary Epidemiology and Preventive Medicine Proceedings, Coventry, UK, p. 175-185, ISSN: 0956-7496 ISBN: 0-948073-49-7.

NAL Call No.: SF780.9.S63

Keywords: infectious disease, biosecurity, dairy farms, economic benefits, book chapter.

van Schaik, G. (2001). ***Risk and economics of disease introduction to dairy farms. [Risico en economie van insleep van ziekten op melkveebedrijven.]*** *Tijdschrift voor Diergeneeskunde* 126(12):414-8, ISSN: 0040-7453.

NAL Call No.: 41.8 T431

Keywords: closed farming system, disease eradication, transmission, bovine virus diarrhoea virus, bovine herpesvirus 1 (BHV1), direct animal contacts, sales, shows, economic model, Dutch language.

van der Lende, T., F.A. de Loos, and T. Jorna (January 2000). ***Postnatal health and welfare of offspring conceived in vitro: a case for epidemiological studies.*** *Theriogenology* 53(2): 549-554, ISSN: 0093-691X.

NAL Call No.: QP251.A1T5

Keywords: in vitro fertilization, humans, livestock, long-term effects on health and welfare of offspring, in vitro culture, blastocyst, epidemiological studies in humans, animal experiments, livestock industry.

Vandenberg, A. (August 14, 2001). **Dairy feeding stanchion having flipper locking design.** *Official Gazette of the United States Patent and Trademark Office Patents* 1249 (2): No Pagination, ISSN: 0098-1133.

NAL Call No.: T223 A21

Keywords: stanchions, housing, milking, feeding, vertically spaced upper and lower horizontal members, swing pipes, spaced positions, free access, economically feasible manner.

Veissier, I., J. Rushen, D. Colwell, and A.Md. Passille (2000). **A laser-based method for measuring thermal nociception of cattle.** *Russian Journal of Ecology* 66(4): 289-304, ISSN: 1067-4136.

NAL Call No.: QH540 E32

Keywords: Holstein calves, methodology, thermography, lasers, measurement, temperature, pain, leg lift, tail flick, response latency, animal welfare, health, management.

Ventura, P.G. (1997). **Ways of increasing the well-being of high-yielding dairy cows. [Soluzioni per aumentare il benessere delle bovine da latte ad alta produzione.]** *Informatore Agrario* 53(35): 77-79.

Keywords: cow housing, barn roof design, ventilation, drinking water, cubicles, bedding, flooring, skin and foot care, Italy, Italian language.

Verkerk, G.A., A.D. Fisher, C.J. Morrow, and L.R. Matthews (1999). **The effects of stressors on milk composition in dairy cows.** *Proceedings of the New Zealand Society of Animal Production* 59: 192-194, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: breed, Jersey, stress, feed restriction, bodyweight, lying, milk composition, protein.

Verkerk, G.A., A.M. Phipps, J.F. Carragher, L.R. Matthews, and K. Stelwagen (1998). **Characterization of milk cortisol concentrations as measure of short-term stress responses in lactating dairy cows.**

*Animal Welfare* 7(1): 77-86, ISSN: 0962-7286.

NAL Call No.: HV4701.A557

Keywords: dairy cows, lactation, corticotropin, transport, hydrocortisone, concentration, milk, blood plasma, stress, animal welfare.

Vokey F.J., C.L. Guard, H.N. Erb, and D.M. Galton (2001). **Effects of alley and stall surfaces on indices of claw and leg health in dairy cattle housed in a free-stall barn.** *Journal of Dairy Science* 84(12):

2686-99, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy herd, housing, alley surfaces, grooved concrete, rubber mats, free stall beds, deep sand, rubber mattresses, concrete, sawdust, hind claws, hocks, lesions, dorsal wall length, heel depth, toe angle, digital dermatitis, scoring.

Vollebregt, R.J., J.P.T.M. Noordhuizen, and H. van der Wal (2001). **From dairy herd health and production management to veterinary consultancy. [Van veterinaire begeleiding naar veterinaire advisering van melkveebedrijven.]** *Tijdschrift Voor Diergeneeskunde* 126 (13): 448-454.

NAL Call No.: 41.8 T431

Keywords: herd health, production management, programs, veterinary practices, professionally oriented veterinary consultancy, profit gains.

Vos, P. (1999). **"The repeat breeder cow," aetiopathogenesis and possible therapies.** *Cattle Practice* 7(1): 93-95, ISSN: 0969-1251.

NAL Call No.: SF961 C37

Keywords: ovarian cysts, ovarian diseases, female infertility, etiology, pathogenesis, treatment, cows, economics, reproductive disorders, embryo mortality, estrus, fertilization, calving interval, milk production, animal housing, nutrition, calving, animal health, animal welfare, metabolic disorders, mastitis, lameness, endometritis.

- Waage, S., S.A. Odegaard, A. Lund, S. Brattgjerd and T. Rothe (2001). **Case control study of risk factors for clinical mastitis in postpartum dairy heifers.** *Journal of Dairy Science* 84 (2): 392-399 ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: heifers, risk factors, clinical mastitis, postpartum, blood in the milk, udder edema, teat edema, milk leakage, significant risk factors, *Staphylococcus aureus*.
- WagtendonkdeLeeuw, A.Mv., E. Mullaart, A.P.Wd. Roos, et al. (2000). **Effects of different reproduction techniques: AI, MOET or IVP, on health and welfare of bovine offspring.** In: *Proceedings of the Annual Conference of the International Embryo Transfer Society, Maastricht, The Netherlands, January 9-11, 2000, Vol.53, No.1*, S.J. Dieleman (ed.), p. 575-597.  
Keywords: MOET, reproduction, birth weight, bulls, calving, culture techniques, congenital abnormalities, embryos, estrus, heart rate, heifers, in vitro culture, malformations, perinatal mortality, semen production, culture, embryo transfer, culture media.
- Waiblinger, S., U. Knierim, and C. Winckler,(2001). **The development of an epidemiologically based on-farm welfare assessment system for use with dairy cows.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(Supplementum 30): 114-117, ISSN: 0906-4702.  
NAL Call No.: S3 A27  
Keywords: animal welfare, assessment, dairy cows, epidemiology, multivariate analysis.
- Ward, W. R. (1999). **Lameness in dairy cattle, an overview.** *Cattle Practice: Journal of the British Cattle Veterinary Association* 7(4): 333-340, ISSN: 0969-1251.  
NAL Call No.: SF961 C37  
Keywords: dairy cattle, reviews, lameness, lesions, foot diseases, dermatitis, animal welfare, pain, economics, risk factors, physiology, locomotion, animal behavior, cattle housing.
- Ward, J.L. and W.C. Rebhun (1992). **Chronic frontal sinusitis in dairy cattle: 12 cases (1978-1989).** *Journal of the American Veterinary Medical Association* 201(2): 326-328, ISSN: 0003-1488.  
NAL Call No.: 41.8 Am3  
Keywords: dehorning, respiratory tract, *Actinomyces pyogenes*, *Pasteurella multocida*, infection, clinical signs, anorexia, lethargy, fever, frontal bone distortion, exophthalmos, abnormal posture, nasal discharge, neurologic abnormalities, treatment, drainage and lavage of the sinus cavity, antibiotics, analgesics.
- Warnick, L.D., D. Janssen, C.L. Guard, and Y.T. Grohn (2001). **The effect of lameness on milk production in dairy cows.** *Journal of Dairy Science* 84 (9):1988-1997, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: foot abscess, foot rot, foot ulcer, lameness, milk production, treatment, New York, USA.
- Warnick, L.D., L.M. Crofton, K.D. Pelzer, and M.J. Hawkins (2001). **Risk factors for clinical salmonellosis in Virginia, USA cattle herds.** *Preventive Veterinary Medicine* 49 (3 4): 259-275 ISSN: 0167-5877.  
NAL Call No.: SF601.P7  
Keywords: clinical salmonellosis, fecal samples, water samples, feed samples, *Salmonella Typhimurium*, significant factors, number of mature cows in herd, calves born in a buildings, poultry manure spread on bordering property, rodents infestation, wild geese.
- Weber, M.F., and J. Verhoeff (2001). **Integrated disease control in dairy herds: A case study from the veterinarians' viewpoint. [Integrale dierziektebestrijding op melkveebedrijven: visie van rundveedierenartsen op een casus.]** *Tijdschrift Voor Diergeneeskunde* 126 (10): 340-345.  
NAL Call No.: 41.8 T431  
Keywords: disease control, bovine virus diarrhoea virus, bovine herpesvirus 1, *Leptospira interrogans* serovar hardjo subtype hardjobovis, *Mycobacterium avium* subsp. paratuberculosis, *Salmonella* Dublin, economic benefits, culling, Netherlands.

Weber, M.F., and J. Verhoeff (2001). **Prevalence of chronic wasting in Dutch dairy herds with a history of chronic health problems.** [Prevalentie van slijtend rundvee op nederlandse melkveebedrijven met een historie van chronische gezondheidsproblemen.] *Tijdschrift Voor Diergeneeskunde* 126(6): 180-183.

NAL Call No.: 41.8 T431

Keywords: Dutch dairy farms, chronic wasting, health problems, cull rates, mortality.

Webster, A.J.F. (2001). **Effects of housing and two forage diets on the development of claw horn lesions in dairy cows at first calving and in first lactation.** *The Veterinary Journal* 162 (1): 56-65, ISSN: 1090-0233.

NAL Call No.: SF601.V484

Abstract: This paper describes a systematic study of the development of lesions of the claw horn (CHL, sole and white line) in heifers calving for the first time, housed either in cubicles or a straw yard and fed either a low- or high-dry-matter forage diet. The feet of all animals were inspected on five occasions, at approximately four weeks before and four, eight, 16 and 24 weeks post calving. Haemorrhagic lesions of the sole and white line were described according to a geometric lesion score for severity and a cumulative lesion score based on the product of (severity x area) for each lesion. Geometric and cumulative lesion scores increased in all groups of cattle in the first eight weeks after calving. However, the severity and persistence of the lesions were significantly greater in cattle housed in cubicle yards. Wet feeding increased the severity of CHL in the cubicle yard only. There were no associations between lesion scores and body weight, body condition or foot conformation. The heels of the cattle in straw yards tended to be thick but many showed pitting erosions. In cubicles the heels were smooth but thin. This may have contributed to CHL by increasing concussive forces within the hoof. There was a highly significant (but relatively low) correlation between scores for sole lesions and lameness in individual animals. These observations are consistent with the hypothesis that systemic events associated with calving and the onset of lactation may set in motion the chain of events that lead to the lesions of CHL; the extent and severity of these lesions being then determined by the externally imposed conditions of housing and feeding.

Keywords: heifers, calving, lactation, cow housing, cubicles, straw yards, forage, dry matter, cattle feeding, moisture, interactions, claws, lesions, body weight, body condition, risk factors, hemorrhage, conformation, feet, lameness, etiology.

Webster, A.J.F. (1997). **The role of the bovine practitioner in cattle welfare.** *Presented at the XIX World Buiatrics Congress, Edinburgh, UK, July 8-12, 1996, Vol.32, No.31.2, p.10-15.*

Keywords: dairy cows, animal welfare, lameness, metabolic disorders, bovine mastitis, milk production.

Weller, R.F. and P.J. Bowling (2000). **Health status of dairy herds in organic farming dairy cows.** *The Veterinary Record: Journal of the British Veterinary Association* 46(3): 80-81, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: organic farming, farm management, dairy herds, health, organic farming, diseases, bovine mastitis, *Streptococcus uberis*, bulk milk, somatic cell count, incidence, cubicles, straw yards.

Wells, S.J., S.L. Ott, and A.H. Seitzinger (November 1998). **Key health issues for dairy cattle: new and old.** *Journal of Dairy Science* 81(11): 3029-3035, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: The objective of this paper is to use available information to evaluate the relative importance of various health issues affecting dairy cattle. In addition to traditional ranking using evaluation methods based on impacts to animal productivity, this paper considers zoonotic risks, international trade implications, and animal welfare concerns. Traditional production costs rank mastitis, reproductive problems, and lameness as the top dairy cattle diseases. When the other areas of importance are included, the top-ranked diseases change to include salmonella, Johne's disease, bovine viral diarrhea-associated disease, and mastitis. Researchers in the dairy industry may want to reevaluate their criteria for setting research priorities to include zoonotic risks, international trade implications, and animal welfare concerns.

Keywords: dairy cows, health, milk production, health issues affecting dairy cattle, zoonotic risks, international trade implications, animal welfare concerns, mastitis, reproductive problems, lameness, dairy cattle diseases, salmonella, Johne's disease, bovine viral diarrhoea, review, bovine mastitis, production costs, bovine diarrhoea virus, paratuberculosis, zoonoses, cryptosporidiosis, foodborne diseases, international trade, decision making, research projects, dairy research.

Westwood, C.T., and L.J. Lean (2001). **Nutrition and lameness in pasture-fed dairy cattle.** *Proceedings of the New Zealand Society of Animal Production* 61: 128-134, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: hoof, health, rumen, digestive system, diseases, chronic ruminal acidosis, digestive system disease, metabolic disease, lameness, epidemiology, etiology, pathology, prevention and control, laminitis, bone disease, connective tissue disease, joint disease, endotoxins, histamine, lactic acid, nutrient detergent fiber, protein, degradation, serotonin, trace elements, inadequate uptake, nutrition, pH, fiber content, moisture content, New Zealand.

Whay, H.R., A.E., A.E. Waterman, A.J.F. Webster, and J.K. O'Brien (1998). **The influence of lesion type on the duration of hyperalgesia associated with hindlimb lameness in dairy cattle.** *The Veterinary Journal* 156: 23-29, ISSN: 1090-0233.

NAL Call No.: SF601 V484

Keywords: health, lameness, claw lesions, hyperalgesia, nociceptive threshold, milking.

Whay, H.R., A.E. Waterman and A.J.F. Webster (1997). **Associations between locomotion, claw lesions and nociceptive threshold in dairy heifers during the peri-partum period.** *The Veterinary Journal* 154 (2): 155-161, ISSN: 1090-0233.

NAL Call No.: SF601 V484

Abstract: The locomotion of 15 heifers was examined at fortnightly intervals over a 4 month peri-partum period. Measurements were made of the development of gait abnormalities, thermal and mechanical nociceptive thresholds, and severity and size of sole lesions observed in the hind claws. All heifers developed lesions at, or shortly after, parturition, and in seven animals this induced marked lameness. Abnormalities of gait were related more to the severity, than to the size of the lesion. Lameness was associated with a significant increase in sensitivity to mechanical noxious stimuli applied to the lame leg but not to a thermal stimulus applied to the ear. This study demonstrated interactions between lameness, claw lesions and the development of hyperalgesia in heifers during the post-partum period.

Keywords: heifers, gait, claws, lesions, pain, prepartum period, postpartum interval, lameness, predisposition.

Whitaker, D.A., J.M. Kelly, and S. Smith (2000). **Disposal and disease rates in 340 British dairy herds.** *The Veterinary Record: Journal of the British Veterinary Association* 146(13): 363-367, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: disposal rates, disease rates, health.

White, L.J., Y.H., Schukken, T.J.G.M. Lam, G. F. Medley, and M.J. Chappell (2001). **A multispecies model for the transmission and control of mastitis in dairy cows.** *Epidemiology and Infection* 127 (3): 567-576, ISSN: 0950-2688.

NAL Call No: RA651 A1E74

Keywords: bovine mastitis, cows, dairy cows, disease control, disease transmission, mastitis,

Wiederkehr, T.U., K. Friedli, and B. Wechsler (2001). **Influence of regular outdoor exercise on occurrence and type of hock lesions of dairy cows kept in tied housing systems. [Einfluss von regelmässigem Auslauf auf das Vorkommen und den Schweregrad von Sprunggelenksschaden bei Milchvieh im Anbindestall.]** *KTBL-Schrift* 403: 163-170.

NAL Call No.: 18 K96

Keywords: dairy cows, disease prevention, exercise, joint diseases, hock lesions, lameness, exercise, lying area, litter, German language.

- Wilson, J.H. (July 1992) **The art of physical diagnosis.** *Veterinary Clinics of North America. Food Animal Practice* 8(2): 169-176, ISSN: 0749-0720.  
NAL Call No.: SF601 V535  
Keywords: dairy cattle, sick animals, physical examination of food animals, physical and rectal, sample recording form.
- Winckler, C., and S. Willen (2001). **The reliability and repeatability of a lameness scoring system for use as an indicator of welfare in dairy cattle.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(Supplementum 30): 103-107, ISSN: 0906-4702.  
NAL Call No.: S3 A27  
Keywords: dairy cows, animal welfare, lameness, scoring system, inter-observer repeatability, lesions, sole disorders, locomotion, methodology.
- Wolf, V., H. Hamann, H. Scholz, and O. Distl (2001). **Systematic effects on the occurrence of abomasal displacements in German Holstein cows. [Systematische einflüsse auf das auftreten von labmagenverlagerungen bei Deutschen Holstein Kuehen.]** *Zuechtungskunde* 73 (4): 257-265, ISSN: 0044-5401.  
NAL Call No.: 49 Z8  
Keywords: cows, German Holstein, breed, risk factors, abomasal displacement, genetic disposition, percent left abomasal displacement, percent right abomasal displacement, influence of calving month, the lactation number, age at calving, calving performance, duration of pregnancy, inbreeding coefficient, did not explain a significant part of the variation of the frequency of the abomasal displacement.
- Wolferstan, F. (2001). **A preliminary report on a study of BSE in cattle in relation to farm husbandry: its possible relevance to vCJD and infertility problems in humans.** *Journal of Nutritional and Environmental Medicine* 11 (3): 205-216, ISSN: 1359-0847.  
NAL Call No.: RM214 J68  
Keywords: farm survey, questionnaire, agricultural chemicals, organophosphorus compounds, breeding, husbandry, bovine spongiform encephalopathy, calves, copper, dams (mothers), suckler herds, trace element deficiencies, etiology vCJD, human infertility problems, United Kingdom.
- Woolhouse, M.E., D.T. Haydon, A. Pearson, and R.P. Kitching (1996). **Failure of vaccination to prevent outbreaks of foot-and-mouth disease.** *Epidemiology and Infection* 116(3): 363-371, ISSN: 0950-2688.  
NAL Call No.: RA651 A1E74  
Keywords: dairy cattle, vaccine trials, antibody responses following vaccination, mathematical model, Saudi Arabia.
- Zadnik, T. (1998). **Herd health management and dairy production strategies in Slovenia in the 21st century.** *Zbornik Veterinarske Fakultete Univerza Ljubljana* 36(1): 129-141, ISSN: 0353-8044.  
NAL Call No.: SF604 L51  
Keywords: cows, dairy herds, dairy farms, health, production, animal welfare, biotechnology, breeding programs, milk composition, consumer preferences, data collection, feeding, feed formulation, milk, lactose, metabolic disorders, milk production, disease prevention, udders, milk fat, milk protein, environment, pollutants, intensive farming, genetic engineering, computers, information technology, data processing, trends, Slovenia.
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NAL Call No.: 60.9 J27  
Keywords: polychlorinated dibenzo p dioxins, polychlorinated dibenzofurans, produced during combustion processes, by products of the manufacture of chlorinated compounds, environmental contaminants, cow's milk, beef, animal fat, forage sampling, field investigation.
- Young, F., D. Platt, D. Logue, H. Ternent, and J. Fitzpatrick (2001). **Bovine Staphylococcus aureus mastitis: Strain recognition and dynamics of infection.** *Journal of Dairy Research* 68(3): 377-388, ISSN: 0022-

0299.

NAL Call No.: 44.8 J823

Keywords: *Staphylococcus aureus*, pathogen, strain variation, mastitis, bacterial disease.

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## Housing

- Adrighetto, I., F. Gottardo, D. Andreoli, and G. Cozzi. (1999). **Effect of type of housing on veal calf growth performance, behaviour and meat quality.** *Livestock Production Science* 57(2): 137-145, ISSN: 0301-6226.  
NAL Call No.: SF1.L5  
Keywords: veal calves, housing system, behavior, weight gain, meat quality, housing, growth, growth performance, meat quality.
- Alban, L. (1996). **Assessing and managing welfare in a Danish dairy herd: problems and a proposal.** In: *Livestock Farming Systems: More than Food Production. Proceedings of the 4th International Symposium, Foulum, Denmark August 22-23, 1996*, J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands p. 262-266, ISSN: 9-07-413449-1.  
NAL Call No.: 49.9 Eu7 no.89  
Keywords: dairy cattle, cow housing, animal welfare assessment, health, management, cattle diseases, foot diseases, clinical examinations, Denmark.
- Alban, L. and J.F. Agger (1996). **Welfare in Danish dairy herds. 2. Housing systems and grazing procedures in 1983 and 1994.** *Acta Veterinaria Scandinavica* 37(1): 65-77, ISSN: 0044-605X.  
NAL Call No.: 41.8 AC87  
Keywords: animal welfare, behavior, health, questionnaires, surveys, descriptive epidemiology, tie stall environments, lameness, feeding, pasture grazing, recommendations, partitions, cubicles, saw dust, resting area, housing systems.
- Amon, B., T. Amon, J. Boxberger, and C. Alt (2001). **Emissions of NH<sub>3</sub>, N<sub>2</sub>O and CH<sub>4</sub> from dairy cows housed in a farmyard manure tying stall (housing, manure storage, manure spreading).** *Nutrient Cycling in Agroecosystems* 60 (1/3): 103-113, ISSN: 1385-1314.  
NAL Call No.: S631 F422  
Keywords: air pollution, ammonia, composting, cow housing, tie stalls, dairy cows, emission, farmyard manure, fermentation, methane, nitrous oxide, stacking, manure treatment.
- Amon, T., J. Boxberger, P. Schatz, and C. Kummernecker (1997). **Evaluating the suitability of dairy husbandry systems in terms of animal welfare by means of a comparative analysis of the models TGI 35 L/1995 and TGI 200/1994. [Beurteilung der Tiergerechtigkeit von Milchviehhaltungssystemen anhand einer vergleichenden Modellanalyse TGI 35 L/1995 und TGI 200/1994.]** In: *Schriftenreihe der Eidgenossische Forschungsanstalt für Agrarwirtschaft und Landtechnik*, R. Weber (ed.), Eidgenossische Forschungsanstalt für Agrarwirtschaft und Landtechnik: Tanikon, Switzerland, No.45, p. 24-35.  
Keywords: cows, husbandry, cattle housing, dairy farming, animal welfare, models, evaluation, quality standards, testing, comparisons, German language.
- Aneshansley, D.J., and R.C. Gorewit (1999). **Sensitivity of Holsteins to 60 Hz and other waveforms present on dairy farms.** In: *ASAE/CSAE-SCGR Annual International Meeting, Toronto, Ontario, Canada, 18-21 July, 1999*, American Society of Agricultural Engineers (ASAE): St Joseph, USA, 13 p.  
NAL Call No.: S671.3 A54

Keywords: dairy farms, lactating Holstein cows, animal welfare, electricity, electric current, steady state, transient and momentary waveforms.

Barash, H., N. Silanikove, A. Shamay, and E. Ezra (2001). **Interrelationships among ambient temperature, day length and milk yield in dairy cows under a Mediterranean climate.** *Journal of Dairy Science* 84 (10): 2314-2320, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, Holstein, breed, calving season, dairy performance, daylight, photoperiod, Mediterranean climate, environmental temperature, temperature patterns, effects on lactation, milk protein yield, milk yield, stress, stress response.

Barrington, S. (1999). **Comfort of cows in tethered housing. [Le confort de la vache en stabulation entravee.]** *Producteur de Lait Quebecois* 19(5): 22-26, ISSN: 0228-1686.

Keywords: cow housing, tethered housing, design, animal welfare, rest, feeding, cattle housing, milk yield, French language.

Bergmann, J. and W. Heuwieser (2000). **Cow-comfort: optimal performance only possible under optimal conditions. Cubicle design. [Kuh-Komfort: optimale Leistung nur durch optimale Bedingungen. Liegeboxengestaltung.]** *Milchpraxis* 38(2): 68-71, ISSN: 0026-3753.

NAL Call No.: SF221 M5

Keywords: cows, animal welfare, design, housing, dairy cattle, German language.

Bergmann, J., J. Kluth, and W. Heuwieser (2000). **Cow comfort: optimal keeping only possible under optimal conditions. Part 1: behaviour and cattle housing. [Kuh-Komfort: optimale Leistung nur durch optimale Bedingungen. Teil 1: Verhaltensbiologie und Stallgestaltung.]** *Milchpraxis* 38(1): 14-16, ISSN: 0026-3753.

NAL Call No.: SF221 M5

Keywords: cows, cattle farming, behavior, cattle housing, animal welfare, German language.

Berry, E.A. (1998). **Mastitis incidence in straw yards and cubicles.** *The Veterinary Record: Journal of the British Veterinary Association* 142(19): 517-518, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: dairy cows, cattle housing, cubicles, yards, bovine mastitis, winter, lameness, bulk milk, leukocyte count, dairy herds, animal welfare.

Bewley, J., R.W. Palmer, and D.B. Jackson-Smith (2001). **A comparison of free-stall barns used by modernized Wisconsin dairies.** *Journal of Dairy Science* 84 (2): 528-541, ISSN: 0022-0302.

NAL Call No: 44.8 J822.

Abstract: A primary objective of the Wisconsin Dairy Modernization Survey was to compare features of free-stall barns available to dairy producers. This study used data from a large random sample of expanding dairy farms to determine whether the theoretical benefit of particular free-stall configurations bear out under on-farm conditions. Comparisons were made among herds using free-stall barns as their primary housing for new versus remodeled facilities, barn design, bedding used, feed-delivery design, manure removal strategies, animal restraint, maternity areas, overcrowding, and cooling methods. Producers who made the transition from tie-stall housing to free-stall housing were satisfied with this decision. New free-stall barns provided a more desirable environment for the herds than remodeled free-stall barns, although initial investments were higher. When new free-stall barns were compared, herds with four-row barns had higher production, lower somatic cell count, and higher stocking rates than herds with six-row barns. Respondents were more satisfied with four- and six-row barns than with two- and three-row barns. Respondents felt sand provided some advantages for cow comfort, while satisfaction with bedding cost and manure handling was higher with mattresses. Dairy Herd Improvement data showed no difference in milk production or somatic cell count for producers who chose sand or mattress-based free stalls. Respondents were more satisfied with the use of drive-through feeding than other feed-delivery designs. Most producers chose to use tractor scrapers to remove manure; however, producers who used automated systems were more satisfied with manure management. Few

differences were observed when comparing self-locking head gates to palpation rails. Overcrowding did not have any adverse affect on production or user satisfaction with feed intake or cow comfort. Using supplemental cooling appeared to facilitate higher production.

Keywords: dairy farms, dairy herds, expansion, barns, stalls, cow housing, litter, sand, mats, animal welfare, cattle dung, waste disposal, milk production, stocking density, building, construction, somatic cell count, cattle husbandry, mobile feeders, restraint of animals, calving, pens, cow comfort, new barns, remodeled barns, drive-through feeding, Wisconsin.

Bickert, W.G. and G.W. Atkeson (1997). **Dry cow facilities: early dry, pre-calving and maternity.** In: *Livestock Environment 5, Volume 2. Proceedings of the Fifth International Symposium, Bloomington, Minnesota, USA, May 29-31, 1997, No. 1*, R.W. Bottcher and S.J. Hoff (eds.) American Society of Agricultural Engineers (ASAE): St Joseph, USA, p. 1063-1068, ISSN: 0-92-935584-9. NAL Call No.: SF91 L58 1997.

Keywords: cow housing, cow comfort, barn design, management, dairy farms, stalls.

Blanken, K., and J. van Lent (2001). **Reduced ammonium emission with steel grids. [Lagere ammoniakemissie bij stalen roosters.]** *Praktijkonderzoek Rundvee* 14(2): 29-30, ISSN: 1386-8470.

Keywords: ammonium, housing, cattle manure, dairy cows, emission, floors, steel grid floor, steel grid floor and top layer covered by sand, steel grid floor and grooved top layer temperature, concrete grid floors, Dutch language, Netherlands.

Blanken, K., H.J. van Dooren, and M. de Haan (2001). **New housing for young cattle at the low cost farm. [Nieuwe jongveestal op het lagekostenbedrijf.]** *Praktijkonderzoek Rundvee* 14 (5): 11-13, ISSN: 1569-805X.

Keywords: calves, calf housing costs, investment, comparison of different types of housing Dutch language, Netherlands

Blanken, K., J. van Lent, and G. Smolders (2001). **Claw health on steel grids is also good. [Klauwgezondheid op stalen roosters ook goed.]** *Praktijkonderzoek Rundvee* 14 (2): 1-3, ISSN: 1386-8470.

Keywords: dairy cows, housing, health, animal welfare, steel floors, concrete grid floors concrete, feeding behavior, feet, floors, foot diseases.

Bockisch, F.J., T. Jungbluth, and A. Rudovsky (1999). **Technical indicators for evaluation of housing systems for cattle, pigs and laying hens relating to animal welfare.** *Zuechtungskunde* 71(1): 38-63, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: cattle, chickens, laying hens, pigs, production, animal welfare, climate control, feed supply, floor design, housing system, evaluation indicators, waste handling, water supply, German language.

Bockisch, F.J. (1996) **Aspects of animal-friendly loose housing for dairy cows. [Aspekte zu tierangepassten Laufstall systemen fur Milchkuhe.]** *KTBL-Arbeitspapier* 233: 149-156, ISSN: 0930-0295.

NAL Call No.: S674.43 G3K8

Keywords: dairy farms, cow housing, automation, loose housing versus stanchion systems, animal welfare, ergonomics, labor, costs, free movement, lying and feeding area, cow size, milk yields, conference paper.

Bodman, G.R. (1994/1995). **Designing the Cow Environment for Comfort** Agricultural Research Division, Institute of Agriculture and Natural Resources, University of Nebraska, Lincoln (65-A): 31-32.

NAL Call No.: 100 N27M

Keywords: cow housing, design, dairy hygiene.

Bolinger, D.J., J.L. Albright, J. MorrowTesch, and S.J. Kenyon, and M.D. Cunningham (1997). **The effects of restraint using self-locking stanchions on dairy cows in relation to behavior, feed intake, physiological parameters, health, and milk yield.** *Journal of Dairy Science* 80(10): 2411-2417, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: Holstein cows (n = 64) ranging from peak to end lactation were restrained in self-locking stanchions (i.e., head locks) for approximately 4 h/d for four periods in a modified switchback design. Milk yield, milk fat percentage, somatic cell count, and dry matter intake were unaffected by restraint. Milk protein percentage was significantly lower for cows that were restrained. Plasma cortisol concentrations and the ratio of neutrophils to mononuclear cells were not significantly different between restrained and unrestrained (control) cows. No difference in the incidence of mastitis or other health concerns was noted. Behaviorally, cows that were locked in the stanchions spent significantly more time lying after release from restraint. For cows that were locked up, eating frequency over 24 h was significantly reduced, but dry matter intake was not affected. Total rumination frequency over 24 h was not significantly different for cows that were restrained; however, cows that were restrained ruminated less during the day following release. Grooming was considered to be a behavioral need and was significantly increased during all times when cows were not locked up. Grooming was also one of the first behaviors performed following release. Acts of aggression were elevated during all periods following restraint, but oral behaviors, such as tongue playing and chewing on objects, drinking behavior, and resting postures were not affected. The use of self-locking stanchions did not appear to affect substantially the overall well-being of the cow.

Keywords: dairy cows, restraint of animals, milk yield, milk fat percentage, milk protein percentage, animal welfare, somatic cell count, feed intake, dry matter, blood plasma, hydrocortisone, blood picture, agonistic behavior, physical activity, pastures, rumination, eating, grooming, drinking, self locking stanchions, tethering, restraint, behavior, grooming, tongue playing, chewing objects, animal welfare, feed intake, milk yield, health, milk composition, milk fat, milk protein, hydrocortisone, plasma cortisol, neutrophils, somatic cell.

Borell, E. von, and S. van den Weghe (1999). **Development of criteria for the assessment of housing systems for cattle, pigs and laying hens in relation to animal welfare and environmental impact.**

[**Erarbeitung von messbaren Kriterien für die Einschätzung von Haltungsverfahren für Rinder, Schweine und Legehennen bezüglich ihrer Tiergerechtigkeit und Umweltwirkung.**] *Zuchtungskunde* 71(1): 8-16, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: housing, poultry, cattle, pig, animal welfare, environmental impact, economics, feeding, manures, waste disposal, German language.

Boxberger, J., T. Amon, and B. Amon (1996). **Trends in development of dairy cow housing.** [Stallbauliche **Entwicklungstendenzen in der Milchviehhaltung.**] *Praktische Tierarzt* 77: 35-40, ISSN: 0032-681X.

NAL Call No.: 41.8 P882

Keywords: dairy cattle, cows, housing, behavior, movement, animal welfare, design, trends, German language.

Brade, W. (1999). **Recommendations for appropriate humane housing for dairy cattle.** [Empfehlungen zur **tiergerechten Milchviehhaltung.**] *Tierärztliche Umschau* 54(12): 692-698, ISSN: 0049-3864.

NAL Call No.: 41.8 T445

Keywords: dairy cows, cow housing, cubicles, tethered, loose housing milking parlors, computers, milking machines, hygiene, automation, animal welfare, German language.

Brunsch, R., J. Trilk, D. May, and O. Kaufmann (2001). **Large open-front dairy cow house with automatic milking system in Gross Kreutz.** *Landtechnik* 56 (4): 262-263, ISSN: 0023-8082.

NAL Call No.: 58.8 L235

Keywords: cow housing, dairy farming, design, milking machines, milking robots, design, German language, Germany.

Buenger, A, V. Ducrocq, and H.H. Swalve (2001). **Analysis of survival in dairy cows with supplementary data on type scores and housing systems from a region of northwest Germany.** *Journal of Dairy Science* 84 (6): 1531-1541, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: In survival analysis, type traits can be included as covariates to evaluate their use as predictors for survival. One problem in such an analysis is the availability of suitable data. Whereas data on the length of productive life (LPL) of individual cows can be retrieved from milk recording data, for type traits, all cows in the population must be scored for type at least once. In the present analysis, a dataset from the Osnabruck region in northwestern Germany, which fulfilled this requirement in recent years, was used. Data consisted of 169,733 cows with information on LPL for calving years 1980 to 1996 (dataset I) and of 39,233 cows with information on LPL and type for calving years 1990 to 1996 (dataset II). A further dataset (III) contained 43,116 cows from calving years 1987 to 1996 and included information on the housing system for each herd. The basic model included stage of lactation, relative production within herd, change of herd size, and year-season as time dependent effects; age at calving as a time-independent effect; and herd-year-season and sire as random effects. Other effects (information on type, housing system) were included additionally. For dataset II, the scores for 15 linear type traits were also included as corrected phenotypic values, estimated breeding values, and residuals from a previous BLUP analysis. The package Survival Kit 3.0 was used for all analyses. The results indicate a moderate heritability of 0.17 and 0.18 for true and functional LPL (dataset I). Almost all type traits analyzed (dataset II) exceeded a 0.001 level of significance in their effect on survival. The strongest relationships between survival and type were found for udder depth, fore udder attachment, and front teat placement. The main result from the comparison of housing systems (dataset III) was that bedding has a positive effect on survival.

Keywords: dairy cows, survival, housing, prediction, milk yield, calving, livestock numbers, temporal variation, phenotypes, Germany.

Busato, A., P. Trachsel, J.W. Blum (May 2000). **Frequency of traumatic cow injuries in relation to housing systems in Swiss organic dairy herds.** *Journal of Veterinary Medicine. Series A.* 47(4): 221-229, ISSN: 0931-184X.

NAL Call No.: 41.8 Z5

Keywords: dairy herds, dairy cows, housing, trauma, risk factors, risk assessment, organic farming, animal welfare, nutritional state, milk yield, body condition, lesions, husbandry.

Caenegem, L. van, and J.M. Anceau (2001). **Cattle houses in mountain areas (Engadin): optimized cold house or warm house. [Rindviehstalle im Berggebiet (Engadin): Kaltstall oder Warmstall optimieren.]** *FAT-Berichte, Switzerland (No.572)*, Eidgenossische Forschungsanstalt für Agrarwirtschaft und Landtechnik (FAT): Tanikon, Switzerland, 12p., ISSN: 1018-502X.

NAL Call No.: S671.B55

Keywords: building materials, carbon dioxide, cattle housing, costs, cows, design, heat, nurse cows, relative humidity, roofs, snow, temperature, bulletin, Switzerland.

Caenegem, L.V. and H.K. Messerli (1997). **The Open Yard Attached to Loose Housing for Dairy Cows. Ethological and Construction Aspects. [Der Laufhof Für Den Milchvieh-Laufstall. Ethologische Und Bauliche Aspekte.]** No. 504, Eidgenossische Forschungsanstalt für Agrarwirtschaft und Landtechnik (FAT): Tanikon, Switzerland, 8p.

Keywords: dairy cattle, health, animal welfare, seasonal behavior, housing, stalls, outdoor yards, Switzerland German language.

Calamari, L., M.G. Maianti, V. Cappa, and E. Frazzi (1995). **The influence of air speed on yield and milk characteristics in dairy cows during summer.** *Annali della Facolta di Agraria* 35(1/2): 95-107, ISSN: 0540-049X.

NAL Call No.: 16 M582

Keywords: milk composition, milk yield, milk fat, milk protein, lactation, ventilation, housing, summer, heat stress, temperature, triiodothyronine, thyroxine, hydrocortisone, respiration, pH, Italy.

Carlsson, H. (1999). **Cubicles for dairy cows in loose housing dimensions and partition design for more comfort and cleaner cows.** Sveriges lantbruksuniversitet: Institution for lantbruksteknik, Uppsala, Sweden, 47 p., ISSN: 0283-0086.

NAL Call No.: S760.S8 U6 no. 236

Keywords: housing, loose, design, comfort, animal welfare.

Chaplin, S., and L. Munksgaard (2001). **Evaluation of simple method for assessment of rising behaviour in tethered dairy cows.** *Animal Science: An International Journal of Fundamental and Applied Research* 72 (1): 191-197, ISSN: 1357-7298.

NAL Call No.: SF1.A56

Keywords: dairy cows, Friesian, breed, tethered housing, posture, rest, duration, lactation stage, lactation number, physical activity, animal behavior, animal welfare.

Chaplin, S.J., G. Tierney, C. Stockwell, D.N. Logue, and M. Kelly (2000). **An evaluation of mattresses and mats in two dairy units.** *Russian Journal of Ecology* 66(4): 263-272, ISSN: 1067-4136.

NAL Call No.: QH540 E32

Keywords: cows, comfort, mats, floors, litter, ethylethene vinyl acetate, loose rubber crumb with a polypropylene cover, body condition, feed intake, body weight, trauma, hock and knee injury, lameness, locomotion, milk composition, milk yield, milk quality, somatic cell count, feeding, ruminating, and lying behavior, animal welfare, United Kingdom.

Chua, B., E. Coenen, J. van Delen, and D. Weary (2002). **Effects of pair versus individual housing on the behavior and performance of dairy calves.** *Journal of Dairy Science* 85(2): 360-4, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: health, performance, behavior, individually and pair-housed calves, milk fed, ad libitum, artificial teats, single pen, group pen, pair-housed calves.

Cielejewski, H. (1997). **Experience with cold housing for dairy cows. [Erfahrungen mit Kaltställen für Milchvieh.]** *Landtechnik* 52(4): 204-205, ISSN: 0023-8082.

NAL Call No.: 58.8 L235

Keywords: winter, cold zones, cold resistance, cold tolerance, frost, temperature, snow, cattle housing, cow housing, behavior, animal welfare, non-insulated, frozen ball drinkers, frozen silage, frozen slurries, Germany, German language.

Collins, E.R., J.M. Swisher, T.M. Younos, B.B. Ross, R.F. Shank, and K.G. Wooden (1998). **Dairy loafing lot rotational management systems for improving animal well-being and water quality.** In: *Proceedings of the Fourth International Dairy Housing Conference, St. Louis, Missouri, USA, 28-30 January 1998*, J.P. Chastain (ed.), American Society of Agricultural Engineers (ASAE): St Joseph, USA, p. 336-345, ISSN: 0-92-935589-X.

NAL Call No.: SF506 I58 1998.

Keywords: cows, best management practice, cleanliness of cattle, mastitis, grass paddock, earth-surfaced paddock, total dissolved solids, fecal and total coliforms, Escherichia coli, farm management, animal welfare.

Cross, D.E., D.N. Logue, J.E. Offer, L.M. Birnie, and M.A. Lomax (1999). **Does separate housing of newly calved heifers influence social behaviour and lessen claw horn lesion development?** In: *Farm Animal Welfare, Who Writes the Rules? Proceedings of an International Symposium Organized by the British Society of Animal Science, Edinburgh, UK, 1999*, A.J.F. Russel, C.A. Morgan, C.J. Savory, M.C. Appleby, and T.L.J. Lawrence (eds.), British Society of Animal Science (No. 23): UK, p. 157-158.

NAL Call No.: SF5 B74 no. 23

Keywords: heifers, housing, social behavior, animal welfare, legislation, stress, foot diseases, claws, United Kingdom.

Damasceno, J.C., F. Baccari, and L.A. Targa (1999). **Behavior responses of Holstein dairy cows with constant or limited access to shade. [Respostas comportamentais de vacas Holandesas, com acesso a sombra constante ou limitada.]** *Pesquisa Agropecuaria Brasileira* 34(4): 709-715, ISSN: 0100-204X.

NAL Call No.: S15 P452

Keywords: behavior, limited, shade, feeding behavior, heat stress, housing, thermal comfort, rumination, rest, water intake, language, Sao Paulo, Brazil.

Demmers, T.G.M., V.R. Phillips, L.S. Short, L.R. Burgess, R.P. Hoxey, and C.M. Wathes (2001). **Validation of ventilation rate measurement models and the ammonia emission from naturally ventilated dairy and beef buildings in the United Kingdom.** *Journal of Agricultural Engineering Research* 79(1): 107-116, ISSN: 0021-8634.

NAL Call No.: 58.8 J82

Abstract: Measurements of ammonia emission, especially from cattle buildings, are needed to assess the environmental impact of ammonia. There are no data available for cattle buildings in the United Kingdom because most buildings are naturally ventilated and methods for long-term measurement of emission from naturally ventilated buildings have not been developed. Two measurement methods, based on either the release of a tracer gas or on the pressure difference across ventilation openings, were validated in a full-scale cross-section of a naturally ventilated livestock building against a known release rate of a gaseous pollutant at high and low wind speeds. A good correlation between the measured and the actual release rates was found for the tracer gas method with an average recovery rate of 108%. The method based on pressure difference failed to estimate the ventilation rate correctly when only measured pressure coefficients were used, because the measurements of mass flow rates in and out through all openings of the building failed to balance. The traditional approach, based on measured values for the external pressure coefficients and an estimate of the internal coefficient balanced the flow through the building by definition, but failed to estimate the actual emission rate correctly. Current knowledge of the discharge coefficient for the opening designs of the building is insufficient for the pressure difference method to be used to estimate the ventilation rate. Using the tracer method, measurements were carried out between February and May 1996 in a straw-based beef house and a slurry-based dairy cow house with cubicles and scraped passage ways. The buildings were space boarded and had a covered ridge. The ammonia emission was estimated to be 3.5 and 8.9 kg NH<sub>3</sub> per livestock unit per year for the beef and dairy buildings, respectively.

Keywords: ammonia, pollutants, emission, natural ventilation, animal housing, U.K.

Demmers, T.G.M., V.R. Phillips, L.S. Short, L.R. Burgess, R.P. Hoxey, and C.M. Wathes (2001). **Validation of ventilation rate measurement methods and the ammonia emission from naturally ventilated dairy and beef buildings in the United Kingdom.** *Journal of Agricultural Engineering Research* 79 (1): 107-116, ISSN: 0021-8634.

NAL Call No.: 58.8 J82

Keywords: air pollution, ammonia, housing, straw-based beef house, slurry-based dairy cow house with cubicles, emission, mass flow, measurement, methodology, natural ventilation, tracer techniques, United Kingdom.

Dirksen, G. (1996). **Faults of housing and management as a cause of claw and leg disease in cattle: I. Faulty rebuilding of a stanchion-barn into a loose housing with cubicles and slatted floor. [Stallbau- und Haltungsverfahler als Ursache von Klauen- und Gliedmassenerkrankungen in Rinderbestanden.]** *Praktische Tierarzt* 77(10): 924-932, ISSN: 0032-681X.

NAL Call No.: 41.8 P882

Keywords: dairy cows, loose housing, cubicles, slatted floors, improper installation, design defects, feet, hooves, animal welfare, foot diseases, diseases, cattle diseases, Germany, German language.

Dobson, T. (1999). **Getting the Most From Cubicle Housing Comparisons of Dairy Cow Housing in Eastern Europe and North America.** Nuffield Farming Scholarships: Trust (NFST), Uckfield, UK, 19 p., ISBN: 1-90-180181-0.

Keywords: dairy farms, housing, mechanization, animal welfare, management, calf housing, bedding, tethered housing, free stalls, cubicles, labor costs, Europe, North America.

Dooren, H.J. van, and K. Blanken (2001). **Walking on closed floors with furrows: less skidding on floors with profile.[Begaanbaarheid van dichte vloeren beter met groeven: minder slippartijen op geprofileerde vloeren.]** *Praktijkonderzoek Rundvee* 14 (6): 13-15, ISSN: 1569-805X.

Keywords: cows, health, animal welfare, cattle housing, walking, skidding, dairy farming, floors, Netherlands.

Dumelow, J. (Winter 1995). **Testing cubicle mats for dairy cows.** *The Agricultural Engineer* 50(4): 17-21, ISSN: 0308-5732.

NAL Call No.: 58.9 In7

Keywords: dairy cows, cubicles, mats, design, materials, hardness, durability, abrasion resistance, animal welfare, physical properties, hygiene.

Egan, J., N. Leonard, J. Griffin, A. Hanlon, and D. Poole (2001). **A survey of some factors relevant to animal welfare on 249 dairy farms in the Republic of Ireland. Part 1: Data on housing, calving and calf husbandry.** *Irish Veterinary Journal* 54(8): 388-392, ISSN: 0368-0762.

NAL Call No: 41.8 IR4

Keywords: farmer questionnaire, calving assistance, housing, cubicles, nutrition, animal welfare.

Ekelund, K., A. Herlin, P. Michanek, and M. Ventorp (1998). **Simplified Floor Constructions in Cubicles for Cattle. [Forenklade Golv-Konstruktioner I Liggbas For Notkreatur I Losdrift.] Report No.230, Institutionen for Jordbrukets Biosystem och Teknologi, Sveriges Lantbruksuniversitet: Lund, Sweden, 46p.**

Keywords: housing, lying behavior, floors, cubicles, sand, litter/bedding, sand/sawdust mixture on compacted tarmac, sawdust on a soft rubber, concrete, lying behaviour, hygiene of lying area, contamination of soil, costs, comfort, health, animal behavior, animal welfare, comparison between countries, Sweden, USA, Swedish language.

Ferrante, V., E. Canali, M. Verga, S. Mattiello, F. Monti, and F. Gottardo (1999). **Veal calves rearing: behavioural, physiological and pathological indicators.** In: *Recent Progress in Animal Production Science. I. Proceedings of the A.S.P.A. XIII Congress, Piacenza, Italy, 21-24 June, 1999*, G. Piva, G. Bertoni, F. Masoero, P. Bani, and L. Calamari (eds.), FrancoAngeli srl.: Milano, Italy, p. 575-577, ISBN: 88-464-1535-3.

NAL Call No.: SF5 R432 1999

Keywords: animal welfare, behavior, abnormal behavior, veal calves, cattle housing, animal husbandry.

Flaba, J. (1995). **Improving the comfort of fettering in stalls [for cows]. [L'amelioration du confort des stabulations entravees.]** *Agricontact* 275: 27-29, ISSN: 0770-285X.

Keywords: cow housing, tethering, stalls, Belgium, French language.

Fleming, M.W. (1998). **Experimental inoculations with *Ostertagia ostertagi* or exposure to artificial illumination alter peripheral cortisol in dairy calves (*Bos taurus*).** *Comparative Biochemistry And Physiology. Part A, Molecular and Integrative Physiology* 119A(1): 315-319.

NAL Call No.: QP1 C6

Abstract: A series of experiments were conducted on dairy calves (*Bos taurus*) to assess, by way of circulating cortisol, the impact of a parasitic infection as a systemic stressor. The first study was designed to assess the effects of chronic stress on dairy calves resulting from a large bolus inoculation of the nematode parasite, *Ostertagia ostertagi*. Peripheral cortisol concentrations and adrenal cortical competency to adrenocorticotrophic hormone (ACTH) challenge were utilized as indicators of chronic stress for 5 weeks. Calves were cleared of nematodes by anthelmintic treatment after the third week of infection. Calves were challenged with ACTH on weeks 0 and 2, and blood samples were obtained at a 12 x 10-min bleeding schedule. Cortisol concentrations were significantly higher ( $P < 0.05$ ) in the infected calves than in the uninfected calves. The maximal response level to the ACTH challenge was also higher while the calves were infected. Two additional experiments were conducted to investigate the effects of experimental procedures that became evident during Experiment 1. Firstly, calves that had previously been fitted with jugular cannulae were sampled from 3 hr predawn until 5 hr after dawn under red-or white-light incandescent illumination. Calves under red lights had lower initial cortisol concentrations but increased to the concentrations in calves under white lights, indicating a compounding effect of lighting with the procedures of blood-sample acquisition. Secondly, 12 calves were inoculated

with 10,000, 100,000, or 200,000 third-stage, infective larvae of *O. ostertagi*. Blood samples were obtained similarly to the regimen in Experiment 1. Cortisol concentrations were elevated only in the 200,000-dose.

Keywords: cortisol, dairy calves, experimental infections, parasite, nematode, stress, adrenal glands, lighting, well-being.

Forshell, K.P. (1999). **Hoof diseases: a hidden problem. [Klauvsjukdommer: et skjult problem!]** *Buskap* 51(3): 20-21.

NAL Call No.: 49 B96

Keywords: foot diseases, health, productivity, hooves, floors, animal welfare, dairy cattle, cows, Norwegian language, Sweden, Norway.

Frazzi, E. (2001). **Protection against extreme heat on dairy farms. [Le difese contro il caldo estremo nell'allevamento bovino da latte.]** *Informatore Agrario* 57(21): 50-56, ISSN: 0020-0689.

NAL Call No.: 281.8 IN32

Keywords: dairy farming, housing, heat, temperature, cooling systems, design, water sprayers, location, ventilation, ventilators, water, Italian language.

Frazzi, E., L. Calamari, and F. Calegari, and L. Stefanini (2000). **Behavior of dairy cows in response to different barn cooling systems.** *Transactions of the ASAE* 43(2): 387-394, ISSN: 0001-2351.

NAL Call No.: 290.9 Am32T

Keywords: cooling, heat stress, climate, feeding, milk yield, relative humidity, summer, cow housing, behavior, milk quality, environmental temperature, Italy.

Frazzi, E., L. Calamari, and F. Calegari (1998). **Dairy cows heat stress index including air speed parameter.** *Rivista di Ingegneria Agraria* 29(2): 91-96, ISSN: 0304-0593.

NAL Call No.: S671 R5

Keywords: ventilation, sprinklers, dairy cows, heat stress, airflow, cattle housing, Italy.

Frazzi, E., L. Calamari, F. Calegari, M.G. Maianti, and V. Cappa (1997). **The aeration, with and without misting: effects on heat stress in dairy cows.** In: *Livestock Environment 5, Volume 2. Proceedings of the Fifth International Symposium, Bloomington, Minnesota, USA, May 29-31, 1997, No.1*, R.W. Bottcher and S.J. Hoff (eds.), American Society of Agricultural Engineers (ASAE): St Joseph, USA, p. 907-914, ISSN: 0-92-935584-9.

NAL Call No.: SF91 L58 1997

Keywords: environmental control, dairy farms, cow housing, milk production, milk yield, milk composition, rectal temperature, respiration rate, animal welfare, mists, sprinklers, ventilation, Italy.

Fregonesi, J.A., and L.D. Leaver (2001). **Behaviour, performance and health indicators of welfare for dairy cows housed in strawyard or cubicle systems.** *Livestock Production Science* 68 (2/3): 205-216, ISSN: 0343-0200.

NAL Call No.: SF761 Z4

Keywords: dairy cows, behavior, performance, health, animal welfare, housing, straw, milk yield, indicators, loose housing, hygiene, somatic cell count, locomotion, feed intake, rumination, hooves, lameness, lying.

Fritzsche, S. and W. Hartmann (1996). **The 1995/1996 German competition: exemplary cow houses for large dairy herds. [Bundeswettbewerb 1995/96: beispielhafte Milchviehstalle für grossere Bestände.]** *Landtechnik* 51(6): 344-345, ISSN: 0023-8082.

NAL Call No.: 58.8 L235

Keywords: cow housing, dairy cattle, design, German competition, best cow houses for large dairy herds, cost, animal welfare, Germany, German language.

Gaudin, V., P. Billon, and O. Sauvee (1998). **What kind of milking parlour for efficient and comfortable working conditions? [Choisir une salle de traite efficace et confortable.]** *Rencontres Recherches*

*Ruminants* 5: 321-326.

NAL Call No.: SF191.2 R46

Keywords: milking parlors, milking, animal welfare, size, dimensions, husbandry, economics, labor requirements, efficiency, reviews, milking machines, French language.

Gerighausen, G. (1997). **From straw to water beds. Comfortable lying areas in cattle housing. [Vom Stroh bis zum Wasserbett. Liegekomfort in Kuhställen.]** *Milchpraxis* 35(2): 78-81, ISSN: 0026-3753.

NAL Call No.: SF221 M5

Keywords: floor covering evaluation, straw, sawdust, mats, cows, costs, dairy cattle housing, udders, hygiene, dairy hygiene, service life, labor, maintenance, wood chips, wood shavings, floors, litter, characteristics, durability, Germany, German language.

Glaszczka, A. and W. Wardal (1998). **Tests of open stalls in chosen family farms. [Badania obor wolnostanowiskowych w wybranych gospodarstwach rodzinnych.]** In: *Problemy intensyfikacji produkcji zwierzecej przy uwzględnieniu ograniczen ochrony srodowiska. Materiały: IV Miedzynarodowa Konferencja Naukowa, Warszawa, 29-30 Wrzesnia 1998*, Instytut Budownictwa, Mechanizacji i Elektryfikacji Rolniczywa, Komitet Techniki Rolniczej PAN, Polskie Towarzystwo Inzynierii Polniczej: Warsaw, Poland, p. 97-102, ISBN: 8-38-626453-5.

Keywords: dairy cattle, animal welfare, milk quality, management, milk production, cows.

Goodger, W.J., G.G. Frank, K.V. Nordlund, B. Hilbelink, and C. Eisele (1996). **Financial assessment of results of intervention to correct a housing-system problem on a dairy farm.** *Journal of the American Veterinary Medical Association* 209(8): 1406-1410, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: dairy cows, somatic cell count, mastitis, performance, milk production, lameness, health, economics, cow housing, bovine mastitis, milk production, milk prices, costs, investment, returns, cattle diseases, USA, Wisconsin farm, case study.

Halachmi, I. and J.A.P. Heesterbeek (1999). **Computer simulation and a stochastic model for optimal facility allocation in a robotic milking barn.** *ASAE/CSAE-SCGR Annual International Meeting, Toronto, Ontario, Canada, July 18-21, 1999*, American Society of Agricultural Engineers (ASAE): St Joseph, USA, ASAE Paper No. 994011, 4p.

NAL Call No.: S671.3.A54

Keywords: milking, animal welfare, dairy cattle, design, computer simulation, Queuing/Markov model, computer software, milking parlors, milking robots, economics.

Haley, D.B., A. M. de Passille, J. Rushen (2001). **Assessing cow comfort: effects of two floor types and two tie stall designs on the behaviour of lactating dairy cows.** *Applied Animal Behaviour Science* 71(2): 105-117, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: behaviour, animal welfare, cow housing, floors, stalls.

Haley, D.B., J. Rushen, J., and A.M. De Passille (2000). **Behavioural indicators of cow comfort: activity and resting behaviour of dairy cows in two types of housing.** *Canadian Journal of Animal Science* 80 (2): 257-263. ISSN: 0008-3984.

NAL Call No.: 41.8 C163

Abstract: We explored which aspects of dairy cow behaviour provide measures of cow comfort and how housing affects resting time. Following a crossover design, we observed the behaviour of eight lactating Holstein cows kept for three weeks in stalls believed to represent a contrast in comfort. Cows individually housed in large pens with a mattress flooring lay down 4.2 h d<sup>-1</sup> longer than cows housed in tie-stalls on a concrete floor, while cows in tie-stalls stood idle (without eating) for longer. Cows stood up and lay down more often in the large pens and the duration of individual standing bouts was longer in tie-stalls. We found no differences in eating time and few differences in body, head or leg positions cows assumed while lying. There was little evidence of diurnal rhythm in activity. A lower frequency of standing and lying and an increase in the duration of lying bouts suggests that in tie-stalls cows are more

reluctant to change position from lying to standing. The type of pen or stall in which cows are housed can have a substantial impact on resting time. The duration and frequency of lying behaviour and the time spent standing without eating appear to be probable behavioural indicators of cow comfort.  
Keywords: housing, pens stalls, animal behavior, rest, behavior patterns, diurnal activity, animal welfare.

Hansen, K. and C.N. Pallesen (1998). **Dairy cow pressure on self-locking feed barriers.** In: *Proceedings of the Fourth International Dairy Housing Conference, St. Louis, Missouri, USA, January 28-30, 1998*, J.P. Chastain (ed.), American Society of Agricultural Engineers (ASAE): St Joseph, USA, p. 312-319, ISSN: 0-92-935589-X.

NAL Call No.: SF506 I58 1998

Keywords: non-lactating cows, feeding systems, sloping and vertical self-locking feed barriers, pressure exerted by cows on barrier, narrow and wide feed mangers, automatic feed dispensers, animal welfare.

Harada, H. (1997). **Yearly changes of freestall housing and the facilities on dairy management in Aichi Pref. One way towards modern dairy management.** *Research Bulletin of the Aichi-ken Agricultural Research Center* 29: 275-281, ISSN: 0388-7995.

Keywords: cattle husbandry, dairy farming, dairy cattle, stalls, loose housing, litter, crowding, cattle farming, cattle housing, farm workers, farm dairies, farm buildings, farm equipment, agricultural economics, Japan, Japanese language.

Havrevoll, O. (1999). **Feeding and housing of calves. [Foring og oppstalling af kalv.]** *Buskap* 51(3): 12-14.

NAL Call No.: 49 B96

Keywords: cattle housing, calves, feeding, animal welfare, stalls, meat animals, dairy cattle.

Herlin, A.H. (1997). **Comparison of lying area surfaces for dairy cows by preference, hygiene and lying down behaviour.** *Swedish Journal of Agricultural Research* 27(4): 189-196, ISSN: 0049-2701.

NAL Call No.: S3 S8

Keywords: dairy cows, housing, husbandry, concrete flooring, conventional rubber matting, soft rubber matting, tie-down stalls, concrete surfaced cubicles, milk leakage, comfort, hygiene, animal behavior.

Hindhede, J., L. Mogensen, and J.T Sorensen (1999). **Effect of group composition and feeding system on behaviour, production and health of dairy heifers in deep bedding systems.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 49(4): 211-220, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: housing, animal behavior, health, animal welfare, feed intake, liveweight gain, feeding, cattle feeding, nutrition programs, heifers, concentrates, dairy herds, group size, housing, litter, productivity, aggression, stress, groups.

Horning, B. (2001). **The assessment of housing conditions of dairy cows in littered loose housing systems using three scoring methods.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 51(Supplementum 30): 42-47, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: dairy cows, loose housing systems, straw-based, organic farms, conventional farms, costs, comparison of housing systems, Germany.

Horning, B., C. Zeitlmann, and J. Tost (2001). **Differences in the behaviour of dairy cows in the lying area of 40 loose houses.[Unterschiede im Verhalten von Milchkuhen im Liegebereich verschiedener Laufstallsysteme.]** *KTBL-Schrift* 403: 153-162.

Keywords: dairy cows, behavior, housing, cubicles, lying time, straw yards, bedded slope floors, German language.

Horning, B. (1997). **Evaluating the suitability of loose housing with straw litter for dairy cattle using an evaluation index. [Bewertung der Tiergerechtheit von eingestreuten Milchviehlaufställen anhand eines Punkteschemas.]** *Schriftenreihe: Institut für Organischen Landbau* 4: 431-437, ISBN: 3-89-574225-2.

NAL Call No.: 59 V42

Keywords: comparison of dairy farms, conventional farming methods versus organic farming methods, types of housing, deep-litter loose housing, single-section, multi-section, deep litter loose housing, sloping floor, cubicle, loose housing with litter, animal behavior, lying down, feeding, walking, feeding troughs, waterers, space requirements, animal welfare, Germany, German language.

Horning, B. and C. Gaio (1997). **Investigations of loose housing with straw litter for dairy cattle with respect to amounts of straw used, dirtiness of animals and process technology.** [Erhebungen zu Strohverbrauch, Tierverschmutzung und Verfahrenstechnik in eingestreuten Milchviehlaufställen.] In: *Contributions to the 4th Scientific Meeting on Ecological Agriculture, held on 3-4 March 1997, at the Rheinische Friedrich-Wilhelms-Universität Bonn, Vol.4*, Institut für Organischen Landbau: Bonn, Germany, p. 480-487, ISBN: 3-89-574225-2.

NAL Call No.: 59 V42

Keywords: comparison of dairy farms, conventional farming methods versus organic farming methods, cattle housing, loose housing, numbers of straw bales used for litter, cow body soiling index, hygiene, manure removal, costs of using straw, animal welfare, health, Germany, German language.

Horning, B., C. Gaio, and D.W. Folsch (1997). **How loose dairy cattle housing systems with straw function in practice.** [Eingestreuete Milchviehlaufställe in der Praxis.] In: *Schriftenreihe der Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik*, R. Weber (ed.), Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik: Tanikon, Switzerland, No. 45, p. 198-206.

Keywords: cows, cattle housing, animal husbandry, animal welfare, hygiene, dairy farming, evaluation, loose housing, deep litter housing, litter, characteristics, design, utilization, costs, investment, Germany, German language.

Hultgren, J. (2001). **Effects of two stall flooring systems on the behaviour of tied dairy cows.** *Applied Animal Behaviour Science* 73(3): 167-177, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: behavior, resting behavior, slipping behavior, cow housing, tethered housing, tie stalls, solid floors, slatted floors, mats, litter, wood shavings, straw, animal welfare.

Hultgren, J., and C. Bergsten (2001). **Effects of a rubber-slatted flooring system on cleanliness and foot health in tied dairy cows.** *Preventive Veterinary Medicine* 52 (1): 75-89, ISSN: 0167-5877.

NAL Call No.: SF601.P7

Keywords: dairy cows, hygiene, floors, cattle housing, feet, foot diseases, feces, urine, hooves, disease prevalence, Sweden.

Hultgren, J. (2001). **Observational and experimental studies of the influence of housing factors on the behaviour and health of dairy cows.** *Acta Universitatis Agriculturae Sueciae: Veterinaria* (No. 104), Faculty of Veterinary Medicine, Swedish University of Agricultural Sciences: Uppsala, Sweden, 25 p., ISSN: 1401-6257.

NAL Call No.: SF615.A28

Keywords: dairy cows, animal behavior, health, animal welfare, bovine mastitis, diseases, housing, cow trainers, culling, hygiene, floor type, foot diseases, ketosis, litter, loose housing, mastitis, mats, reproductive performance, slatted floors, tethered housing, Sweden.

Hultgren, J., T. Ekman, J. Malgeryd, J. Svedberg, and K. Sallvik (1998). **Don't get caught in the centimetre trap! State directive on minimum stall dimensions for housed cattle.** [Fastna inte i centimeterfallan!] *Svensk Veterinartidning* 50(7): 323-325, ISSN: 0346-2250.

NAL Call No.: 41.9 SV23

Keywords: legislation, dairy cattle, cows, animal welfare, tethered housing, cattle housing, Sweden, Swedish language.

Igono, M.O., H.D. Johnson, B.J. Steevens, G.F. Krause, and M.D. Shanklin (1987). **Physiological, productive, and economic benefits of shade, spray, and fan system versus shade for Holstein cows during**

**summer heat.** *Journal of Dairy Science* 70(5): 1069-1079, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: spray, fan, freestall areas, feeding areas, milk yield, plasma growth hormone, prolactin, freestall utilization, Holstein cows, weekly milk and rectal temperatures, diurnal patterns, plasma growth hormone, assessment of heat stress using milk temperature, cow comfort.

Ipema, A.H. (1997). **Integration of robotic milking in dairy housing systems. Review of cow traffic and milking capacity aspects.** *Computers and Electronics in Agriculture* 17(1): 79-94, ISSN: 0168-1699.

NAL Call No.: S494.5 D3C652

Keywords: milking, housing systems, review, cow integration.

Jacobsen, K.L. (1996). **The well-being of dairy cows in hot and humid climates. Part I. Housing and effects of heat stress.** *Compendium on Continuing Education for the Practicing Veterinarian* 18 (Supplement 4): S137-S143.

NAL Call No.: SF601 C66

Keywords: dairy cattle, cows, heat, humidity, housing, husbandry, milk production, cost benefit analysis, ventilation, heat stress, nutritional disorders, animal welfare, cooling systems.

Jadhav, K.L., S. Brahma, and M.M. Kale (1995). **Comfort zone for maximum milk production in crossbred cattle at Leh (Ladakh).** *Indian Journal of Dairy Science* 48(5): 336-338, ISSN: 0019-5146.

NAL Call No.: 44.8 IN28

Keywords: Holstein x Sahiwal crossbreds, animal welfare, cows, crossbreeding, milk yield, high altitude, environmental temperature, mountain areas, seasonal variation in milk yield, India.

Jensen, M.B. (2001). **A note on the effect of isolation during testing and length of previous confinement on locomotor behaviour during open-field test in dairy calves.** *Applied Animal Behaviour Science* 70(4): 309-315, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: calves, dairy cattle, housing, isolation, physical activity, social animal behavior.

Jensen, M.B. and R. Kyhn (2000). **Play behaviour in group-housed dairy calves, the effect of space allowance.** *Russian Journal of Ecology* 67(1/2): 35-46, ISSN: 1067-4136.

NAL Call No.: QH540 E32

Keywords: dairy cattle, Danish Holstein Friesian calves, locomotor play, open-field test, animal behavior, calf housing, pens, animal welfare, Denmark.

Jensen, M.B., L. Munksgaard, L. Mogensen, and C.C. Krohn (1999). **Effects of housing in different social environments on open-field and social responses of female dairy calves.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 49(2): 113-120, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: effects, housing, social environment, open field responses, group housing, individual housing, loose housing, tethered housing, social behavior, social tests.

Jensen, M.B., K.S. Vestergaard, and C.C. Krohn, and L. Munksgaard (1997). **Effect of single versus group housing and space allowance on responses of calves during open-field tests.** [Erratum: Dec 28, 1998, v. 61 (2), p. 185.] *Applied Animal Behaviour Science* 54(2/3): 109-121, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, heifers, housing, animal behavior, fearfulness, heart rate, behavior patterns, animal welfare.

Johannesson, T., J.T. Sorensen, and L. Munksgaard (1996). **Production environment as a component in a welfare assessment system in dairy cattle herds.** In: *Livestock Farming Systems: More than Food Production. Proceedings of the 4th International Symposium, Foulum, Denmark August 22-23, 1996*, J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands p. 251-255, ISSN: 9-07-413449-1.

NAL Call No.: 49.9 Eu7 no.89

Keywords: cows, animal welfare assessment, herds, animal behavior, injuries.

Kaczor, A. and J. Szyndler (1997). **Resting comfort and body weight gains of calves housed in pens with sloping beds.** [Komfort wypoczynku i przyrosty masy ciała cielat w kojcach z pochyłymi legowiskami.] *Roczniki Naukowe Zootechniki* 24(4): 263-272, ISSN: 0137-1657.

NAL Call No.: SF1 R6

Keywords: cattle housing, calves, heifers, bulls, type of bed, inclination angles of bed, conventional horizontal bed, animal behavior, weight gain, Poland, Polish.

Kain, M.L., S.L. Kochevar, J.N. Sofos, K.E. Belk, C. Rossiter, J.O. Reagon, and G.C. Smith (2001).

**Relationships of live animal scores for ambulatory status, body condition, hide cleanliness, and fecal matter consistency to microbiological contamination of dairy cow carcasses.** *Dairy, Food and Environmental Sanitation* 21(12): 990-998.

NAL Call No.: SF221 D342

Keywords: dairy cows, carcass quality, slaughter, microbial contamination, plate count, lameness, hygiene.

Kant, P. and Jv. Lent (1998). **Much attention to climate and animal well being in high-tech enterprises.** [Veel aandacht voor klimaat en welzijn dier in het high-techbedrijf.] *Praktijkonderzoek Rundvee, Schapen en Paarden* 11(4): 5-6.

Keywords: cow housing, cattle housing, cubicles, dairy cows, milking machines, robots, ventilation, floor space, Netherlands, Dutch language.

Karrer, M. and R. Nitsche (1997). **Investigations into uninsulated housing for dairy cattle.** [Erfahrungen mit Aussenklimastallen für Milchvieh.] In: *Schriftenreihe der Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik*, R. Weber (ed.), No.45, p. 166-172, Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik: Tanikon, Switzerland.

Keywords: cows, dairy farming, husbandry, animal welfare, cattle housing, temperature, environmental control, insulation, design, characteristics, evaluation, cold zones, Germany, German language.

Kaufmann, R., M. Keck, and R. Hauser (1998). **Indications for the design of loose housing in cubicles.**

[Indications pour la configuration de stabulations libres a logettes.] *Technique Agricole* 60(5): 9-24.

Keywords: cubicles, dairy farms, building construction, cattle housing, animal welfare, Switzerland, French language.

Kavolelis, B. (2001). **The climatic conditions in uninsulated cowshed.** In: *[Problemy intensyfikacji produkcji zwierzecej z uwzględnieniem ochrony środowiska i przepisów UE. VII Międzynarodowa Konferencja Naukowa, Warszawa, Polska, 25-26 września 2001]* E. Bien (ed.), Instytut Budownictwa, Mechanizacji i Elektryfikacji Rolnictwa: Warsaw, Poland, ISBN: 83-86264-71-3.

Keywords: housing, dairy cows, insulation, microclimate, cold loose housing, cubicle housing, straw bedding, deep litter, tie stalls, air quality, ammonia, dust, Lithuania.

Kavolelis, B., and R. Bleizgys (2001). **Uninsulated cowshed.** In: *[Aktualni Zadaci Mehanizacije Poljoprivrede. Zbornik Radova 29. Medunarodnog Simpozija Iz Područja Mehanizacije Poljoprivrede, Opatija, 06. - 09. Veljace]*, Lithuanian University of Agriculture, Lithuanian Institute of Agricultural Engineering: Kaunas, Lithuania, p. 307-314, ISBN: 953-6135-32-9.

Keywords: dairy cows, loose housing, cubicle housing system, straw bedding, microclimate conditions, ammonia emission, health, mathematical model, moisture balance, condensation heat transmission coefficient, daily outside air temperature, air quality.

Ketelaar-de Lauwere, C.C., A.H. Ipema, E.N.J. van Ouwkerk, M.M. Hendriks, J.H.M. Metz, J.P. Noordhuizen, and W.G. Schouten (1999). **Voluntary automatic milking in combination with grazing of dairy cows: Milking frequency and effects on behaviour.** *Applied Animal Behaviour Science* 64(2): 91-109, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cattle, breed, Holstein-Friesian, cow, automatic milking system, farm equipment, voluntary automatic milking method, robots, grazing, feeding behavior, resting behavior, pastures, milking, frequency.

Ketelaar-de Lauwere, C.C., M.M.W.B. Hendriks, J.H.M. Metz, and W.G.P. Schouten (1998). **Behaviour of dairy cows under free or forced cow traffic in a simulated automatic milking system environment.** *Applied Animal Behaviour Science* 56(1): 13-28.

NAL Call No.: QL750 A6

Keywords: cow traffic, automatic milking, milking parlors, milking interval, environment, selection system, simulation, animal behavior.

Kjaestad, H.P., and E. Simensen (2001). **Management of calving in Norwegian cubicle-housed dairy herds.** *Acta Veterinaria Scandinavica* 42 (1): 131-137, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: animal housing, calves, calving, cows, dairy cows, management, location of the cow when giving birth, farmer presence, assisted births, suckling, time after birth when cow and calf were separated, cubicles, pasture, calving pens, tethered cows, calf injuries, sheds, surveys, Norway.

Kjaestad, H.P., and E. Simensen (2001). **Cubicle refusal and rearing accommodation as possible mastitis risk factors in cubicle-housed dairy heifers.** *Acta Veterinaria Scandinavica* 42 (1): 123-130, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: dairy cows, heifers, housing, cubicle refusal, sheds, animal wastes, bovine mastitis, calving, epidemiology, mastitis, pregnancy, regression analysis, risk factors, disease incidence, Norway.

Kjaestad, H.P., and H.J. Myren (2001). **Cubicle refusal in Norwegian dairy herds.** *Acta Veterinaria Scandinavica* 42 (1): 181-187, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: dairy herds, heifers, behavior, housing, cubicles, litter, slatted floor pens, livestock numbers, surveys, Norway.

Kjaestad, H.P., and H.J. Myren (2001). **Failure to use cubicles and concentrate dispenser by heifers after transfer from rearing accommodation to milking herd.** *Acta Veterinaria Scandinavica* 42(1): 171-180, ISSN: 0044-605X.

NAL Call No.: 41.8 AC87

Keywords: dairy heifers, age, animal behavior, housing, cubicles, feed dispensers, livestock numbers, surveys, Norway.

Klungel, G.H. (1996). **Comfort of mats defines differences. [Comfort stalmatten bepaalt verschillen.]** *Praktijkonderzoek Rundvee, Schapen en Paarden* 9(6): 10-11.

Keywords: dairy cattle, effects of different types of mats, milk production, hygiene, udders, tits, Netherlands, Dutch language.

Kraszewski, J., S. Wawrzynczak, A. Mandecki, and J. Szyndler(1998). **Comparison of heifer rearing performance in lying-box and deep-litter systems. [Porównanie efektywności wychowu jałowic utrzymywanych systemem boksowo-legowiskowym i na głębokiej ściółce.]** *Roczniki Naukowe Zootechniki* 25(3): 153-165, ISSN: 0137-1657.

NAL Call No.: SF1 R6

Keywords: cows, heifers, liveweight gain, housing, bedding, deep litter, performance, animal welfare, milk yield, animal behavior, Polish language.

Kraszewski, J., J. Szyndler, and S. Wawrzynczak (1996). **Effect of tethered and loose housing on milk yield, milk composition and hygienic quality, and cow behaviour. [Wpływ utrzymania uwieżiowego i wolnostanowiskowego krow na ich wydajność, skład i jakość higieniczna, mleka oraz zachowanie.]**

Krohn, C.C. (1994). **Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments. III. Grooming, exploration and abnormal behaviour.** *Applied Animal Behaviour Science* 42(2): 73-86.

NAL Call No.: QL750 A6

Keywords: environment, grooming, loose housing, tethered housing, exercise, exploration, abnormal behavior, extensive livestock farming.

Krohn, C.C. and L. Munksgaard (1993). **Behaviour of dairy cows kept in extensive (loose housing/pasture) or intensive (tie stall) environments. II. Lying and lying-down behaviour.** *Applied Animal Behaviour Science* 37(1): 1-16, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Keywords: intensive environments, lying behavior, stalls, animal behavior, activity, auditory system, parental behavior.

Kromann, H. (1999). **Cattle housing for calves or young cattle. [Stalde til kalve og ungkvaeg.]** *Landbonyt, Erhvervsjordbruget* 6(9): 21-26.

Keywords: cattle housing, calves, legislation, ventilation, management, construction, litter, stalls, animal welfare, Danish language.

Le Neindre, P. (1993). **Evaluating housing systems for veal calves.** *Journal of Animal Science* 71(5): 1345-1354, ISSN: 0021-8812.

NAL Call No.: 49 J82

Keywords: literature review, veal calves, animal behavior, animal welfare, environment, housing systems, diet, slaughter weight, age, France.

Leblanc, R. (1997). **Comfortable housing for increasing [milk] yield. [Des logettes confortables pour augmenter la production.]** *Producteur de Lait Quebecois* 17(9): 19-22.

Keywords: stress, milk yield, cow housing, stalls, dimensions, feeding, rest, design, reduction, cows, floors, litter, French language.

Lensink, B.J, I. Veissier, and L. Florand (2001). **The farmers' influence on calves' behaviour, health and production of a veal unit.** *Animal Science: An International Journal of Fundamental and Applied Research* 72(1): 105-116.

NAL Call No.: SF1 A56

Abstract: Although veal production is a highly standardized system, there still remains considerable variability in productivity between units. This variability might be due to the farmers working on these units, through differences in stockmanship, work attitudes or behaviour, which in turn may affect animals' fear responses, productivity and health. A survey was conducted on 50 commercial farms affiliated to the same veal company. All units had calves housed in individual crates, a similar number of crates, and the same diets and management advice. Data were collected on: building and general farm characteristics, farmers' backgrounds and their attitudes towards their work and calves, farmers' behaviour food efficiency and mortality) were used to classify veal units as 'high producing' (no. = 24) v. "moderate producing" (no. = 26). Calves were less reactive to people in units where the farmer behaved sympathetically and where there were several stockpersons working. The disease level was lower in units where the farmer had a positive attitude towards the sensitivity of the calves to contact and towards the importance of cleaning. Productivity of the veal unit was associated with the health of the calves but not with their reactivity to people. It is suggested that the farmer can have an influence on the success of the veal unit mainly through his/her ability to control the health of the calves and that a positive attitude towards animals and towards work (specifically cleaning actions) can improve the accuracy of surveillance and care of the animals. Moreover, through his/her behaviour with the calves and his/her

ability to control their health, the farmer can play an important role in assuring calves' welfare.

Keywords: veal calves, calf production, calf diseases, animal health, farmers' attitudes, fearfulness, calf housing, hygiene, stockmen, liveweight gain, feed conversion, mortality, animal welfare, human animal interactions. France.

Lensink, B.J., X. Fernandez, G. Cozzi, L. Florand, and I. Veissier (2001). **The influence of farmers' behavior on calves' reactions to transport and quality of veal meat.** *Journal of Animal Science* 79 (3): 642-652.

NAL Call No.: 49 J82

Abstract: The relationships between farmers' behavior toward veal calves, calves' responses to handling and transport, and veal meat quality were assessed. Two groups of 10 veal units were selected based on previous observed farmers' behavior toward the calves: one group consisted of farmers who had shown predominantly "positive" behavior toward the calves, and the other group of farmers had shown predominantly "negative" behavior. Calves were observed for their reactions to people at the unit, and 20 calves per veal unit were transported either directly to the slaughterhouse or subjected to additional transport consisting of a supplementary 20-min transport with additional unloading and loading. The effort needed to load the calves onto the truck and their behavior during loading was observed. During loading and unloading, and during lairage at the slaughterhouse, potentially traumatic incidents (falling down, hits against structures, slips) were recorded, and heart rate and cortisol measurements were taken. Carcasses were evaluated on their weight, color, conformation, pH, and bruise level. A meat sample was taken from the longissimus thoracis muscle for physical, chemical, and sensory analysis. Calves originating from "positive behavior" units showed fewer fear responses to people at the veal unit, needed less effort to be loaded to the truck, had lower heart rates during loading and unloading, and had fewer incidents at the slaughterhouse than calves from "negative behavior" units ( $P < 0.05$ ). Carcasses from calves from "positive behavior" units were paler, and analyses of the meat sample revealed lower pH, moisture level, and redness compared to carcasses from calves from "negative behavior" units ( $P < 0.05$ ). Additional transport led to a lower cortisol level after transport and to higher carcass pH values at slaughter compared to direct transport ( $P < 0.05$ ) but did not affect meat quality. We concluded that farmers' positive behavior toward veal calves during rearing is likely to reduce the emotional responses of calves to handling and transport and to lead to fewer incidents, compared to negative behavior. This reduction of calves' emotional responses seems to be the reason for improved veal meat color.

Keywords: veal calves, transport of animals, cattle husbandry, animal husbandry, animal behavior, stress, hydrocortisone, heart rate, carcass quality, carcass weight, meat quality, color, pH, conformation, bruises, heme, cooking losses, shear strength, moisture content, sensory evaluation, tenderness, flavor, veal, farmers, behavior patterns, animal handling.

Lensink, B.J., X. Boivin, P. Pradel, P. Le Neindre, and I. Veissier (2000). **Reducing veal calves' reactivity to people by providing additional human contact.** *Journal of Animal Science* 78(5): 1213-1218, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: We studied the importance of the stock-person's behavior on veal calf behavior using 22 veal calves housed in individual crates. Eleven calves received minimal contact from the stockperson, and the other 11 calves were stroked and allowed to suck the stockperson's fingers after each meal during the entire fattening period (21 wk). The effects of this additional contact with the stockperson on the calves' responses to people was studied, when in their home environment (crate) or outside their home environment (singly in a novel arena). When tested in their home environment, the calves receiving additional contact withdrew less from the approach of humans (familiar or unfamiliar) ( $P < .05$ ) compared with control calves. When tested outside the home environment with a human (familiar or unfamiliar) standing motionless, calves that had received additional contact interacted more frequently and for a longer time with the humans and defecated less often compared with control calves ( $P < .05$ ). In conclusion, being stroked and sucking the stockperson's fingers seemed to be experienced as positive by the calf, because they reduced withdrawal from and increased approaches to familiar and unfamiliar humans in familiar and unfamiliar environments. Such a lower reactivity to people could improve ease of handling, animal performance, and animal welfare.

Keywords: animal behavior, animal welfare, veal calves, fearfulness, escape responses, handling, human-animal interactions.

Lensink, B.J., X. Fernandez, X. Boivin, P. Pradel, P. Le Neindre, and I. Veissier (2000). **The impact of gentle contacts on ease of handling, welfare, and growth of calves on quality of veal meat.** *Journal of Animal Science* 78(5): 1219-1226, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: It has been demonstrated previously that regularly stroking and letting calves suck fingers leads to less avoidance and more approach behavior of the calves toward people. To examine whether these positive contacts affect the welfare and productivity of calves and the quality of veal meat we used 22 veal calves housed in individual crates. Half of them received minimal contact with the stockperson (controls), and the other half were given additional gentle contacts around meals, by stroking the calves and allowing them to suck the stockperson's fingers, during the entire fattening period (21 wk). Welfare was assessed through behavioral reactivity (reactions to handling, to surprise stimuli, and to novelty), neuroendocrine responses to stress (cortisol in response to an ACTH challenge, catecholamine-synthesizing enzymes), and health (number of medical treatments, abomasal lesions). Calf productivity was assessed through growth rates and meat quality through glycolytic potential (an estimator of resting glycogen level in muscle), pH, and color. Calves that received gentle contacts were less agitated ( $P < .01$ ) and tended to defecate less ( $P = .08$ ) when handled in a cart on wheels than the control calves, but no treatment effects were found in reactivity to novelty and surprise stimuli, responses to ACTH, and catecholamine synthetic potential. Calves given gentle contacts had fewer abomasal lesions than controls (0/11 vs 4/11,  $P = .05$ ). The glycolytic potential of the semimembranosus muscle was higher in calves that received gentle contacts than in controls (172.6 vs 154.1 micromol/g,  $P < .05$ ), but no treatment effects were observed on meat pH, meat color, or growth rates. It is concluded that gentling veal calves reduces their reactions to handling. Gentle contacts reduce the reaction to transport shown by differences in glycolytic potential. In addition, the reduction in reactions to handling and the decreased incidence of abomasal lesions can contribute to an improvement of the calves' welfare.

Keywords: animal behavior, calves, handling, meat quality, veal, human-animal interactions.

Lent, Jv. and A. Pieters (1998). **Building for a high-tech farm. [Bouwen voor een high-techbedrijf.]** *Praktijkonderzoek Rundvee, Schapen en Paarden* 11(5): 6-8.

Keywords: cattle housing, dairy farms, slatted floors, ventilation, animal welfare, cattle feeding, lying cubicles, design, cow housing, Netherlands, Dutch language.

Leonard, F.C. and J.M. Oconnell (1997). **Cubicle housing conditions and cow comfort.** *Irish Veterinary Journal* 50(11): 675-682, ISSN: 0368-0762.

NAL Call No.: 41.8 IR4.

Keywords: cattle housing, animal behavior.

Lischer, C.J., A. Dietrich-Hunkeler, H. Geyer, J. Schulze, and P. Ossent (2001). **Healing process of uncomplicated sole ulcers in dairy cows kept in tie stalls: clinical description and biochemical investigations. [Heilungsverlauf von unkomplizierten Sohlengeschwuren bei Milchkuhen in Anbindehaltung: Klinische Beschreibung und blutchemische Untersuchungen.]** *Schweizer Archiv für Tierheilkunde* 143( 3 ):125-133, ISSN: 0036-7281.

NAL Call No.: 41.8 SCH9

Keywords: dairy cows, hoof health, lameness, scoring system, biotin, glucose, hematology, nutritional status, healing, horns, retinol, ulcers, German language.

Manninen, E., A. M. de Passille, J. Rushen, M. Norring, and H. Saloniemi (2002). **Preferences of dairy cows kept in unheated buildings for different kind of cubicle flooring.** *Applied Animal Behaviour Science* 75(4): 281-292, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, Friesian, breed, flooring, cubicles, deep straw, soft rubber mats, sand bedding, preference testing, paired choice procedure, summer, winter.

- Marten, F. and J. Wolf (1999). **Effect of different mats on resting time of dairy cows. [Einfluss verschiedener Bodenbeläge auf die Liegedauer von Milchkuhen.]** *Milchpraxis* 37(2): 90-94, ISSN: 0026-3753.  
NAL Call No.: SF221 M5  
Keywords: cattle housing, dairy farms, mats, floors, costs, cleaning, installing, labor requirements, resting behavior, German language, European Union countries.
- Matias, J.M. (1998). **Behavior of grazing purebred and crossbred dairy cows under tropical conditions.** *Applied Animal Behaviour Science* 59(1/3): 235-243, ISSN: 0168-1591.  
NAL Call No.: QL750.A6  
Keywords: dairy cows, crossbreds, Holstein-Friesian, Sahiwal, physical activity, grazing, respiration rate, air temperature, imported breeds, relative humidity, wind speed, rain, animal behavior.
- Mayer, D.G., T.M. Davison, M.R. McGowan, B.A. Young, A.L. Matschoss, A.B. Hall, P.J. Goodwin, N.N. Jonsson, and J.B. Gaughan (1999). **Extent and economic effect of heat loads on dairy cattle production in Australia dairy cattle.** *Australian Veterinary Journal* 77(12): 804-808, ISSN: 0005-0423.  
NAL Call No.: 41.8 Au72  
Keywords: heat loads, temperature, humidity, mapping, milk production, economics, thermoregulation.
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NAL Call No.: SF967.M3N32  
Keywords: dairy cows, cubicles, structural design, space requirements, dimensions, animal welfare.
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NAL Call No.: 49 Z8  
Keywords: husbandry, animal welfare requirements, dairy cows, milking parlors, cattle housing, pig housing, slatted floors, poultry housing, broilers, deep litter housing, waste gases, ammonia, ventilation, environmental impact, German language.
- Meyer, W., and H. Georg (2001). **Influence of floor design on the claw health of dairy cows. [Einfluss der Laufflachengestaltung auf die Klauengesundheit von Milchkuhen.]** *Landtechnik* 56(4): 258-259, ISSN: 0023-8082.  
NAL Call No.: 58.8 L235  
Keywords: dairy cows, cow housing, floors, slatted, mats, chopped straw, unclean surfaces, claws, foot diseases, hooves, infection, German language.
- Millar, K.M. (2000). **Respect for animal autonomy in bioethical analysis: the case of Automatic Milking Systems (AMS).** *Journal of Agricultural and Environmental Ethics* 12(1): 41-50, ISSN: 0893-4282.  
NAL Call No.: BJ52.5 J68  
Keywords: milking, cows, ethics, robots, animal welfare, behavioral freedom, motivation, automation, milking machines.
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NAL Call No.: S3 A27  
Keywords: dairy cattle, housing, calves, cows, handling, lactation, milk, milk production, milking, pens, cattle housing, animal welfare, human-animal relationship.
- Mogensen, L., Krohn, C.C., Sorensen, J.T., Hindhede, J., and L.H. Nielsen (1997). **Association between resting behaviour and live weight gain in dairy heifers housed in pens with different space allowance and floor type.** *Applied Animal Behaviour Science* 55(1/2): 11-19, ISSN: 0168-1591.  
NAL Call No.: QL750.A6

Keywords: dairy cattle, heifers, rest, behavior patterns, liveweight gain, cattle housing, floor pens, space requirements, floor space, floor type, slatted floors, litter, welfare.

Mogensen, L., L.H. Nielsen, J. Hindhede, J.T. Soorensen, and C.C. Krohn (1997). **Effect of space allowance in deep bedding systems on resting behaviour, production, and health of dairy heifers.** *Acta Agriculturae Scandinavica. Section A, Animal Science* 47(3): 178-186, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: Danish commercial dairy farms, Danish Friesian, breed, dairy cows, heifers, resting behavior, daily gain, feed intake, feed conversion ratio, heel horn erosion, animal welfare, health, production, Denmark.

Moore, R.P. (1998). **Perception and reality welfare in farm animals.** In: *Ethics, Welfare, Law and Market Forces: The Veterinary Interface: Proceedings of a Symposium Organised on Behalf of the Royal College of Veterinary Surgeons and the Universities Federation for Animal Welfare and Held at the Royal College of Veterinary Surgeons 14th-15th November 1996*, A.R. Michell and R. Ewbank (eds.), UFAW: Wheathampstead, England, p. 67-70, ISBN: 0900767995.

NAL Call No.: HV4704.E84 1998.

Keywords: livestock, animal welfare, housing, cattle, dairy cows, husbandry.

Morita, S., M. Komiya, K. Izumi, K. Oikawa, and S. Hoshihara (2001). **Changes of the utilization of trough, stall and automatic milking machine after the transfer cows to automatic milking system.** *Journal of Rakuno Gakuen University, Natural Science* 26 (1): 57-61, ISSN: 0388-001X.

Keywords: dairy cows, behavior, diurnal variation, automatic milking machines, housing, tie-stalls, free-stall, automatic milking trough use, Japanese language.

Morita, S., S. Nishino, S. Hoshihara, A.H. Ipema, and J.H.M. Metz (1996). **Choice of feeding position of dairy cows in free-stall barn.** *Journal of Rakuno Gakuen University, Natural Science* 21(1): 115-122, ISSN: 0388-001X.

NAL Call No.: QH2.J68

Keywords: choice, feeding, free stall.

Mudron, P., G. Kovac, P. Bartko, J. Choma, and I. Zezula (1996). **Effect of vitamin E on the cortisol and lactate levels and the acid base equilibrium of calves subjected to transport stress.** [Vplyv vitamínu E na hladinu kortizolu, laktátu a acidobazicku rovnovahu u teliat vystavených transportnej zatazi.] *Veterinarni Medicina* 41(3): 71-76, ISSN: 0375-8427.

NAL Call No.: 41.9 C333

Keywords: blood chemistry, lactates, hydrocortisone, transport of animals, calves, vitamin E, stress, language, Slovakian.

Mudron, P., G. Kovac, V. Bajova, J. Pistl, J. Choma, P. Bartko, and H. Scholz (1994). **Effect of vitamin E on some leukocytic parameters and functions in transported calves.** *DTW: Deutsche Tierärztliche Wochenschrift* 101(2): 47-49, ISSN: 0012-0847.

NAL Call No.: 41.8 D482

Keywords: stress, calf diseases, road transport, leukocytes, immunoglobulins, phagocytosis, vitamin E, neutrophils, lymphocytes, hydrocortisone.

Muller, C.J.C., J.A. Botha, and W.A. Smith (1996). **Effect of confinement area on production, physiological parameters and behaviour of Friesian cows during winter in a temperate climate.** *South African Journal of Animal Science* 26(1): 1-5, ISSN: 0375-1589.

NAL Call No.: SF1 S6

Keywords: feed-intake, earthen mound, dry lots, camp size.

Munksgaard, L. and H.B. Simonsen (1995). **Behavioural and pituitary-adrenal axis responses of tethered cows or cows kept in pens with slatted floors.** *Acta Agriculture Scandinavica Section A, Animal Science* 45(2): 132-138, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: dairy cows, ACTH, animal behavior, cortisol, floor-type.

Nardone, A., N. Lacetera, U. Bernabucci, and B. Ronchi (1997). **Composition of colostrum from dairy heifers exposed to high air temperatures during late pregnancy and the early postpartum period.** *Journal of Dairy Science* 80(5): 838-844, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: This study examined the effects of heat stress on composition of colostrum from primiparous cows during late pregnancy and the early postpartum period. Two groups of 6 Holstein heifers were utilized. During the last 3 wk of pregnancy and during the first 36 h after calving, one group was exposed to thermal comfort (temperature-humidity index = 65); the other group was exposed to high air temperatures (temperature-humidity index = 82 from 0900 to 2000 h and temperature-humidity index = 76 from 2100 to 0800 h). Heifers under heat stress had higher rectal temperatures and respiratory rates; lower plasma triiodothyronine and glucose; higher plasma nonesterified fatty acids and beta-hydroxybutyrate; lower intakes of dry matter, net energy for lactation, and crude protein; higher water intakes; and lower body condition scores. The decline of plasma immunoglobulins (Ig) over the final 2 wk of pregnancy was less pronounced for heifers under heat stress. For the first four milkings, colostrum of cows exposed to high air temperatures had lower mean concentrations of IgG and IgA; lower mean percentages of total protein, casein, lactalbumin, fat, and lactose; lower contents (grams per liter) of short- and medium-chain fatty acids; lower energy; lower titratable acidity; and higher pH. Thus, high air temperatures during late pregnancy and the early postpartum period markedly affected the composition of colostrum from primiparous dairy cows.

Keywords: heifers, cow colostrum, heat stress, pregnancy, dry period, postpartum period, dairy cows, lactation number, body temperature, environmental temperature, blood sugar, blood plasma, fatty acids, 3-hydroxybutyric acid, respiration rate, triiodothyronine, feed intake, dry matter, water intake, energy intake, protein intake, milk fat percentage, milk protein percentage, lactose, pH, IGG, IGM, IGA, casein, lactalbumin, lactoglobulins, pregnancy, heat stress, air temperature, humidity, feed intake, dry matter, energy requirements, immunoglobulins, immunity, blood, milk protein, lactose, lactalbumin, medium chain fatty acids, titratable acidity, triiodothyronine, water intake, IgA, IgG, pH, milking, colostrum, composition, environmental temperature, heifers.

Nicoletti, J.L.M. de, F.A.A. de Souza, A. Thomassian, C.A. Hussni, and A.L.G. Alves (2001). **Feet lesions and lameness prevalence in dairy cows kept in permanent confinement (free-stall and tie-stall).**

[Prevalencia de lesoes podais e graus de claudicacao em vacas leiteiras mantidas em confinamento permanente ("free-stall" e "tie-stall").] *Revista de Educacao Continuada do CRMV-SP* 4 (2): 24-32, ISSN: 1516-3326.

Keywords: dairy cows, age differences, number of parturitions, housing, tie-stall, free stall, disease prevalence, foot diseases, lameness, lesions, sole bleeding, white line disease, heel erosion, double sole, interdigital dermatitis, hoof cracks,

Nielsen, L.H., L. Mogensen, C. Krohn, J. Hindhede, and J.T. Sorensen (1997). **Resting and social behaviour of dairy heifers housed in slatted floor pens with different sized bedded lying areas.** *Applied Animal Behaviour Science* 54(4): 307-316, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: social behavior, slatted floor, pens, area, resting.

Nita, O. (2001). **Application of slaked lime in the byre and dairy and its results.** *Journal of Veterinary Medicine, Japan* 54 (3): 191-194, ISSN: 0447-0192.

Keywords: cow housing, buildings, calcium hydroxide, ceilings, dairies, paints, slaked lime, walls, Japanese language.

Nosal, D. and E. Bilgery (2002). **Milking without stress. [Larm und Vibrationen in Melkanlagen.]** *Agarforschung* 9(1): 4-7, ISSN: 1022-663X.

NAL Call No.: S469 S9A37

Keywords: dairy cows, milking, stress, noise, airborne, structure-borne sound (vibration).

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NAL Call No: SF604 B7  
Keywords: dairy cows, Bohemian Red Pied, breed, muscle tissue damage, muscular dystrophy, mineral deficiencies, potassium, selenium, stress, downer cows, transport of animals, change in housing, locomotor activity, deaspartate aminotransferase, creatine kinase, glutathione peroxidase, lactate dehydrogenase.
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NAL Call No.: 18 K96  
Keywords: bulls, Holstein Friesian, Red Holstein, breed, behavior, human animal interaction, aggressive behaviors, presenting body; pulling mouth to a bow, pawing with forelegs, rubbing head on the ground, snorting, bellowing, poking tongue, housing, German language.
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NAL Call No.: HV4701.A557  
Keywords: dairy cows, behavior, training, food reward, flooring type, discrimination, preferences, smooth epoxy resin surface, surface-applied bauxite aggregates, floors covered in excreta, static friction, walking.
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NAL Call No.: 44.8 J822  
Keywords: dairy cows, locomotion, floors, with a smooth epoxy resin surface, surface-applied bauxite aggregate, static friction, walking, food reward.
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NAL Call No.: HV4701.A557  
Keywords: dairy cows, conditioning, stimuli, molasses, learning ability, cattle slurry, floors, lighting, animal welfare, preferences.
- Phillips, C.J.C. and I.D. Morris (2000). **The locomotion of dairy cows on concrete floors that are dry, wet, or covered with a slurry of excreta.** *Journal of Dairy Science* 83(8): 1767-1772, ISSN: 0022-0302.  
NAL Call number: 44.8 J822  
Keywords: locomotion, floor type, concrete, cattle slurry, depth, slip, velocity, joints, legs, gait.
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NAL Call No.: HV4701.A557  
Keywords: gait, legs, joints, light intensity, velocity, animal welfare.
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NAL Call No.: 41.8 B45  
Keywords: dairy cattle, housing, husbandry, loose housing, tethering, profitability, abnormalities, animal

welfare, leukocyte count, checklists, cows, trauma, interviews, milk, milk yield, pregnancy, questionnaires, interviews, economics, qualifications of dairy stockmen, handling of animals, poor management, injury, number of inseminations per pregnancy, age of cow, cell count of milk, milk yield, German language.

Purushottam, S. and S. Kiran (2002). **Shelter seeking behaviour of dairy cattle in various types of housing systems.** *Indian Journal of Animal Sciences* 72(1): 91-95, ISSN: 0367-8318.

Keywords: crossbred, lactating cows, shelter system, shelter seeking behavior, loose housing, loose housing with central shed, closed housing, tree-shade, summer, rainy season, winter season.

Rabaud, N.E., T.A. James, L.L. Ashbaugh, and R.G. Flocchini (2001). **A passive sampler for the determination of airborne ammonia concentrations near large-scale animal facilities.**

*Environmental Science and Technology* 35 (6): 1190-1196, ISSN: 0013-936X.

NAL Call No.: TD420.A1E5

Keywords: dairies, cow housing, dairy cattle, pollution.

Redbo, I., A. Ehrlemark, and P. Redbo-Torstensson (2001). **Behavioural responses to climate demands of dairy heifers housed outdoors.** *Canadian Journal of Animal Science* 81 (1): 9-15, ISSN: 0008-3984.

NAL Call No.: 41.8 C163

Abstract: The aim of the present study was to investigate the behavioural responses to different climatic demands of growing dairy heifers, during winter at a latitude of 60 degrees N. Two groups (n = 11, 12) of yearling dairy heifers were housed in two similar 3-ha enclosures, characterised by deciduous forest, ley and pasture. Each enclosure also contained a lying area, a heated water source and a feed bunk from which the heifers had free access to grass silage. The behaviour and location of each heifer were recorded by instant interval observations every 5 min between 0600 h and 2000 h during 23 observation days spread over the entire winter period. Outdoor temperature, wind speed and solar radiation were measured continuously. The climatic energy demand (CED, W m<sup>-2</sup>) was measured with a heated animal model. The climate had significant effects on all the main activities and on the location of the heifers. Higher CED values corresponded to a greater number of observations of heifers in the lying area, and a greater incidence of lying and of ruminating, but to a decreased incidence of eating and grazing. Increased migration to the forested areas instead of to open areas reflected increasing CED values. The results from the present study show that dairy heifers adapt their behavioural activity and choice of location to the climatic conditions, to reduce energy expenditure. Thus, dairy heifers can be sustained in a cold climate if they are provided with wind breaks and dry lying places.

Keywords: heifers, dairy cattle, winter, cold, animal behavior, environmental temperature, wind speed, solar radiation, energy expenditure, Sweden.

Reinemann, D.J., L.E. Stetson, J.P. Reilly and N.K. Laughlin (1999). **Dairy cow sensitivity to short duration electrical currents.** *Transactions of the ASAE* 42(1): 215-222, ISSN: 0001-2351.

NAL Call No.: 290.9 Am32T

Abstract: The results of 299 tests to determine the behavioral response threshold of dairy cows to a variety of short-duration or "transient" electrical current waveforms via the muzzle to 4-hoof pathway are reported. The phase duration of stimuli tested ranged from 10 micros to 8.3 ms. Phase duration is defined as the time between two consecutive zero crossing points of the waveform (e.g., 1/2 cycle of a sinusoidal waveform). The amplitude of the electrical currents, at a given phase duration, were increased in an ascending series. The lowest threshold current at which an observer could detect a behavioral change was determined for individual cows. Various behaviors were quantified. Facial activity was the most sensitive behavioral response followed by front hoof lifting. Human observers measurements of hoof lifting agreed well with automated recording of animal motion. Tail motion showed no statistically significant response to the current stimulus. Cows were less sensitive (e.g., more current was required to elicit a response) to shorter duration or higher frequency waveforms. The strength-duration relationship observed for cows agreed well with neuro-electrical models previously verified by human response.

Keywords: sensitivity, duration, electrical, current, stray voltage, stray current, transient voltage, electrical stimulation duration, electric fences, animal behavior.

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NAL Call No.: SF1.L5  
Keywords: heifers, dairy cows, heat stress, food restriction, blood chemistry, progesterone, estradiol, LH, FSH, prolactin, hydrocortisone, hormone secretion, feed rations, air temperature.
- Rossi, P., and A. Gastaldo (2001). **The milking parlour: a difficult choice for the breeder of dairy cows.** [Sala mungitura: una scelta difficile per gli allevatori di vacche da latte.] *Informatore Agrario* 57 (8): 85-90, ISSN: 0020-0689.  
NAL Call No.: 281.8 IN32  
Keywords: dairy cows, dairy farming, animal welfare, design, herringbone parlors, auto-tandem arrangement, investment, labor requirements, milk production, milk quality, milking machines, milking parlors, Italian language.
- Rossi, P. and A. Gastaldo (1999). **Innovative solutions for free stables organized in cubicles.** [Soluzioni innovative per la stalla libera a cuccette.] *Informatore Agrario* 55(21): 35-41.  
NAL Call No.: 281.8 IN32  
Keywords: cattle housing, cow housing, dairy cows, mats, cubicles, stalls, floor coverings, Italian language, European Union countries.
- Ruud, L.E.(1999). **Stalls that permit lying down: cows' beds.** [Liggebasen: kuas seng.] *Buskap* 51(3): 28-29.  
NAL Call No.: 49 B96  
Keywords: dairy cattle, cow housing, loose housing, floor coverings, hay, mattresses, stall dimensions, cleaning, drainage, welfare, farm buildings, animal behavior, Norway, Norwegian language.
- Saharia, J., S. Saikia, and G.N. Dutta (1998). **Effect of flooring type on foot and leg abnormalities in dairy cows.** *Indian Veterinary Journal* 75(6): 579-580, ISSN: 0019-6479.  
NAL Call No.: 41.8 IN2  
Keywords: dairy cows, housing, concrete flooring, wooden flooring, bursitis, bruises, hooves, foot diseases, hoof elongation, hock injuries, animal welfare.
- Schaub, J., K. Friedli and B. Wechsler (1999). **Soft floor mats for loose box housing of dairy cattle. Straw mats and six makes of soft floor mats are compared.** [Weiche Liegematten für Milchvieh-Boxenlaufställe. Strohmatratzen und sechs Fabrikate von Weichen Liegematten im Vergleich.] *Bundesamt für Veterinarwesen (BVET), c/o Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik (FAT), CH-8356 Tanikon, Switzerland, No.537, Eidgenössische Forschungsanstalt für Agrarwirtschaft und Landtechnik (FAT): Tanikon, Switzerland, 8p.*  
Keywords: cows, housing, animal behavior, resting, standing, litter, types of floor mats, Mouflex, Cow Comfort, Kraiburg Typ KSK, Pasture, Comfy Cushion, Agriprom, joint damage, injuries, animal welfare, hygiene, German language.
- Schon, H., L. Rittel, G. Wendl, M. Karrer, and H. Pirkelmann (1998). **Cattle housing solutions for the use of automatic milking systems.** [Stallbaulösungen für den Einsatz automatischer Melksysteme.] *Landtechnik* 53(4): 262-263, ISSN: 0023-8082.  
NAL Call No.: 58.8 L235  
Keywords: automation, milking, cattle housing, dairies, animal welfare, design, German language.
- Seufert, H. (1997). **Dairy cattle housing which takes into account cost-effectiveness, animal physiology and animal welfare.** [Tier- und leistungsgerechte Haltungssysteme für Milchkuhe unter Beachtung der Kostenminimierung.] *Zuchtungskunde* 69(6): 421-434, ISSN: 0044-5401.  
NAL Call No.: 49 Z8  
Keywords: overview of housing for dairy cows in Germany, profitability, farmers, dairy technology, animal welfare, production, husbandry, cost analysis, manure removal, floor types, litter, milking parlors,

milking robots, udders, milk production, labor, farm management, financial planning, Germany, German language.

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NAL Call No.: S542 B7E3

Keywords: cows, heat stress, climate, housing, European breeds, Brazil, Portuguese language.

Shearer, J.K., D.K. Beede, D.R. Bray, and R.A. Bucklin (1999). **Managing during heat stress.** *Proceedings of the Tri-State Dairy Nutrition Conference 99-111.*

NAL Call No.: SF203.T75

Keywords: dairy cattle, heat stress, performance, health, environmental management, cooling systems, shade, acidosis, acid base equilibrium, lameness, body heat loss.

Singh, S.S., W.R. Ward, K. Lautenbach, and R.D. Murray (1993). **Behaviour of lame and normal dairy cows in cubicles and in a straw yard.** *The Veterinary Record: Journal of the British Veterinary Association* 133(9): 204-208, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: animal behavior, housing, cubicles, straw, lameness, health, animal behavior, housing, cubicles.

Sonck, B., J. Daelemans, and J. Langenakens (1999). **Preference test for free stall surface material for dairy cows.** In: *ASAE/CSAE-SCGR Annual International Meeting, Toronto, Ontario, Canada, July 18-21, 1999*, ASAE Paper No. 994011, American Society of Agricultural Engineers (ASAE): St Joseph, USA, 10 p.

NAL Call No.: S671.3.A54

Keywords: dairy cows, housing, housing, preference tests, Kraiburg rubber mat, Supercomfort cow mattress, Pasture Mat, Blister Mattress, Kraiburg Soft Bed System, Enkamat K2000, Comfy Cushion, Alfa Laval Comfort Mat, Alanta Waterbed, Agritarp Mattress, concrete littered with sawdust, comfort, animal welfare, rest, animal behavior, claw and leg lameness.

Stale, F. (1998). **Two convincing buildings in Jura. [Deux constructions convaincantes en pays jurassien.]** *Technique Agricole* 60(6): 5-7.

Keywords: legislation, pig housing, cattle housing, cow housing, steers, dairy cows, animal welfare, Switzerland, French language.

Stefanowska, J., D. Swierstra, C.R. Braam, and M.M.W.B. Hendriks (2001). **Cow behaviour on a new grooved floor in comparison with a slatted floor, taking claw health and floor properties into account.**

*Applied Animal Behaviour Science* 71(2): 87-103, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, cow housing, floors, floor type, slatted floors, animal behavior, time, movement, claws, trauma, animal health, animal welfare, cattle dung, farm equipment, time budgets, floor walkability, manure scrapers.

Stefanowska, J., M. Plavsic, A.H. Ipema, and M.M.W.B. Hendriks (2000). **The effect of omitted milking on the behaviour of cows in the context of cluster attachment failure during automatic milking.**

*Applied Animal Behaviour Science* 67(4): 277-291, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cows, milking interval, milking parlors, automatic control, failure, clusters, animal behavior, posture, eating, resting, drinking, urination, defecation, milk yield, lactation number, social dominance, animal welfare.

Stefanowska, J. and H. Hogeveen (1997). **Time study on dairy cows in an automatic milking system with a selection unit and one-way cow traffic.** *Canadian Agricultural Engineering* 39(3): 221-229, ISSN: 0045-432X.

NAL Call No.: 58.8 C164

Keywords: selection, time, automatic system, cow traffic.

Steinhardt, M. and H.H. Thielscher (March 1997). **Hemoglobin derivatives in blood of cattle during winter housing. Effect of age as well as developmental and functional conditions.** *DTW:*

*DeutscheTierärztliche Wochenschrift* 104(3): 99-103, ISSN: 0341-6593.

NAL Call No.: 41.8 D482

Keywords: peripheral venous blood samples, lactating dairy cattle, calves, hemoglobin content, hematocrit, oxygen saturation, oxygen capacity, oxygen content, hemoglobin derivatives, differences between age groups and breeds, German language.

Sunesson, A.L., J. Gullberg, and G. Blomquist (2001). **Airborne chemical compounds on dairy farms.**

*Journal of Environmental Monitoring* 3(2): 210-6.

Keywords: dairy farms, housing, cow sheds, volatile organic compounds, formaldehyde, ammonia, carbon dioxide, p-cresol, 2-butanone, ethyl acetate, alpha-pinene and delta 3-carene, occupational exposure level.

Swierstra, D., C.R. Braam, and M.C. Smits (2001). **Grooved floor system for cattle housing: ammonia emission reduction and good slip resistance.** *Applied Engineering in Agriculture* 17(1): 85-90, ISSN: 0883-8542.

NAL Call No.: S671.A66

Abstract: To improve the slip resistance of solid floors in dairy cow houses and to achieve the ammonia emission reduction prescribed by the Dutch government, precast concrete floors with grooves and a dung scraper were investigated. The grooves parallel to the alley had 160 mm center-to-center spacing and were 35 mm wide and 30 mm deep. The urine could drain along the grooves. Perforations in the grooves were spaced 1.1 m apart and could be open or closed. When the perforations were open, urine could be drained directly into a slurry pit below. In case of closed perforations, draining of urine was only possible at one alley end. The feces were dragged to one end of the alley using a scraper, provided with facilities, that also cleaned the grooves. The floor system was constructed in a compartment of a mechanically ventilated experimental cow house. In another compartment a traditional slotted floor served as a reference. Ammonia emissions from both compartments were recorded continuously. The effects on ammonia emission and the performance of the perforations in the floor were determined. The floor system was also implemented into various practical farms and some practical experiences were gathered. Ammonia emission from the compartment with the grooved solid floor operating with open perforations was reduced by 46% compared with the reference compartment. Closing of the perforations resulted in an ammonia emission reduction of 35% compared to the reference compartment.

Keywords: cattle housing, floors, cattle dung, urine, removal, equipment, ammonia, emission, grooved concrete floors, dung scrapers.

Szyndler, J. and A. Kaczor (1997). **Behaviour of dairy cows in litter and litter-free tie-in stalls of different size. [Zachowanie sie krow mlecznych na wiazanych stanowiskach sciolowych i bezsciolowych o roznym wymiarach.]** *Roczniki Naukowe Zootechniki* 24(4): 249-262, ISSN: 0137-1657.

NAL Call No.: SF1 R6

Keywords: cattle housing, litter, litter-free tie-in stalls, stall dimensions, on the, cleanliness, skin injuries and abrasions, legs, udder, health, animal behavior, lying, standing, animal welfare, Poland, Polish language.

Takahashi, K., H. Takenaka, and I. Inano (1998). **Improvement of cow comfort by using rubber filled cow mattresses.** *Bulletin of Hokkaido Prefectural, Agricultural Experiment Stations* 75:89-94, ISSN: 0441-0807.

NAL Call No.: S304 H6E22

Keywords: animal welfare, cows, cow housing, cattle housing, litter, rubber, Japan.

Terosky, T.L., L.L. Wilson, C.L. Stull, and W.R. Stricklin (1997). **Effects of individual housing design and size on special-fed Holstein veal calf growth performance, hematology, and carcass characteristics.**

*Journal of Animal Science* 75(7): 1697-1703, ISSN: 0021-8812.

NAL Call No.: 49 J82

Keywords: veal, calves, carcass quality, housing, design, size, Holstein, growth, performance, width, blood, lymphocytes, erythrocytes, meat, color, carcass weight, dressing percentage, stalls, pens, management.

Uetake, K., J.F. Hurnik, and L. Johnson (1997). **Behavioral pattern of dairy cows milked in a two-stall automatic milking system with a holding area.** *Journal of Animal Science* 75(4): 954-958, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: Behavioral pattern was investigated in dairy cows milked in an automatic milking system (AMS) in contrast to cows milked in a conventional milking parlor. Forty-eight Holstein cows were allocated to two groups of 24 animals. The two groups were housed in adjacent free stall pens. Both groups were milked twice a day at 0500 and at 1500 for 30 d before commencement of the experiment, one in a two-stall AMS (AMS Group), the other in a 16-stall herringbone parlor (Parlor Group). The respective holding areas were used to encourage cows to enter the milking compartments. All cows consumed total mixed rations ad libitum, provided once a day between 0500 and 0600 in indoor feed bunks. Cows in both groups were allowed daily access to two adjacent outdoor paddocks from 1030 to 1230. Behavioral observations were carried out in the free stall barn from 0400 to 0900 and from 1250 to 1900 for 30d. The number of cows lying down, standing in the stalls, standing in the passageway, and eating was recorded every 10 min. Analyses of variance were used to compare time serial changes in behavioral states between groups. Although the time serial changes in the behavioral states were not different between groups after returning from paddocks, they became significantly different between groups for all four recorded behavioral states after the onset of milking. Ethograms during the 11-h observation period showed that cows in the AMS group spent less time eating at the feed bunk and standing in the stalls to compensate for the longer time standing in the holding area. The results indicate that AMS milking with a holding area affects social synchronization of cows eating and resting and reduces time spent eating.

Keywords: automation, milking machines, milking parlors, behavior, milk yield, lactation stage, age, posture, eating, duration, activity sampling.

Vaarst, M., J. Hindhede, and C. Enevoldsen (1998). **Sole disorders in conventionally managed and organic dairy herds using different housing systems.** *Journal of Dairy Research* 65(2): 175-186, ISSN: 0022-0299.

NAL Call No.: 44.8 J823

Keywords: dairy herds, housing, lameness, handling, feet, lesions, hemorrhage, lactation stage, breed differences, Friesian, body weight, lameness, deep litter housing, stalls, hooves, organic farming, slatted floors, straw, litter, calving season, Denmark., AG AB.

Valtorta, S.E., P.E. Leva, and M.R. Gallardo (1997). **Evaluation of different shades to improve dairy cattle well-being in Argentina.** *International Journal of Biometeorology* 41(2): 65-67, ISSN: 0020-7128.

NAL Call No.: 340.8 In8

Keywords: tree shades, artificial shade structure, black woven polypropylene cloth, black globe temperatures, effectiveness in reducing heat load, floor temperatures, holding pens, pasture-based system, animal well-being.

Valtorta, S.E., M.R. Gallardo, H.C. Castro, and M.E. Castelli (1996). **Artificial shade and supplementation effects on grazing dairy cows in Argentina.** *Transactions of the ASAE* 39(1): 233-236, ISSN: 0001-2351.

NAL Call No.: 290.9 Am32T

Keywords: cows, mid-lactation, heat stress, summer, grazing, parity, somatic cell count, milk quality, blood composition, milk protein, sodium, potassium, urea, body temperature, milk yield, milk composition, milk protein yield.

van Schaik, G., M. Nielen, and A.A. Dijkhuizen (2001). **An economic model for on-farm decision support of management to prevent infectious disease introduction into dairy farms.** *Preventive Veterinary Medicine* 51(3-4): 289-305, ISSN: 0167-5877.

NAL Call No: SF601 P7

Keywords: closed farming system, disease control, bovine herpesvirus type 1 (BHV1), models. sanitary barrier, protective clothing.

Veissier, I., A.R. Ramirez, and P. Pradel (1998). **Nonnutritive oral activities and stress responses of veal calves in relation to feeding and housing conditions.** *Applied Animal Behaviour Science* 57(1-2): 35-49, ISSN: 0168-1591.

NAL Call No.: QL750 A6

Abstract: This study assessed the extent to which eating solid foods and social contacts influence nibbling objects and improve the welfare of veal calves. Animals were fed milk replacer only vs. supplemented with solid foods and were housed in individual stalls vs. together in pens. Time budget, reactions to handling in a weighing machine, growth, health (length of medical treatments) and abomasal lesions were assessed. In addition, chronic activation of the hypothalamo--pituitary--adrenocortical axis was evaluated after ACTH and CRF challenges, and that of the sympathetic nervous system, through activities of catecholamine-synthesising enzymes. The provision of solid foods reduced time spent nibbling objects and being inactive in proportion to and at the time of the increase in time spent eating and chewing. The calves housed together in pens had higher basal cortisol levels and they reacted to weighing. Health and physiological indices of chronic stress did not vary with feeding or housing conditions. It is concluded that nibbling in veal calves derives at least in part from a lack of development of feeding behaviour appropriate to ruminants. There was no clear evidence of poorer welfare due to feeding on milk replacer only or individual housing, but calves reared in groups seemed more stressed by handling than calves reared in individual stalls.

Keywords: oral activities, food, chewing, feeding behavior, milk replacer, social contacts, individual housing, group housing, stalls, pens, time budget, handling, growth, health, medical, treatments, lesions, sympathetic nervous system, stress response, enzymes, basal, cortisol, chronic stress conditions, development.

Veissier, I., P. Chazal, P. Pradel, and P. Le Neindre (1997). **Providing social contacts and objects for nibbling moderates reactivity and oral behaviors in veal calves.** *Journal of Animal Science* 75(2): 356-365, ISSN: 0021-8812.

NAL Call No.: 49 J82.

Abstract: The aim of this work was to assess the role of social and physical enrichment in the adaptation of veal calves to their environment. We compared calves housed in individual stalls that varied in the extent of contacts they allowed between neighbors (16 calves: open partitions; 16 calves: solid partitions; 32 calves: solid and extended partitions preventing all contact). All but 16 out of the 32 isolated calves were provided with a piece of tire and a chain, objects they could easily nibble. We assessed time budget, behavioral reactions to a water throw, neuroendocrine responses to stress (ACTH challenge and catecholamine synthesis), health, and growth. Calves kept in isolation displayed more startled reactions (16 isolated calves vs 5 non-isolated calves were startled by the throw,  $P < .05$ ). Calves without objects spent more time nibbling at the feeding grille (5 vs 3% time,  $P < .01$ ), licking their lips and tongue-rolling (7 vs 4% time,  $P < .05$ ). Social contacts and the provision of objects had no incidence on neuroendocrine measurements and growth. Contacts with neighbors resulted in a slight but nonsignificant rise in disease. Depriving calves of social contacts increases behavioral reactivity, probably because there are no peer animals through which reactions can be moderated, and the lack of adequate objects to nibble promotes self-directed activities.

Keywords: calves, animal behavior, neurohormones, stress, veal, calf housing, stalls, group size, animal welfare, partitions, enrichment, toys, grooming, fright, rest, blood plasma, hydrocortisone, stress response, breed differences, Holstein-Friesian, Montbeliard, health, lesions, stomach ulcers, scars, nibbling, sniffing, lip-licking, tongue-rolling.

- Veissier, I., V. Gesmier, P. Le Neindre, J.Y. Gautier, and G. Bertrand (1994). **The effects of rearing in individual crates on subsequent social behaviour of veal calves.** *Applied Animal Behaviour Science* 41(3/4): 199-210, ISSN: 0168-1591.  
NAL Call No.: QL750.A6  
Keywords: veal calves, social behavior, housing, isolation rearing, crates.
- Ventura, P.G. (1999). **European cow-sheds ever more economic in 2000. [Sempre piu economica la stalla europea del 2000.]** *Informatore Agrario* 55(25): 38-41.  
NAL Call No.: 281.8 IN32  
Keywords: cattle housing, design, costs, waste management, construction materials, netting walls, European Union Countries, Italian language.
- Ventura, P.G. (1997). **Ways of increasing the well-being of high-yielding dairy cows. [Soluzioni per aumentare il benessere delle bovine da latte ad alta produzione.]** *Informatore Agrario* 53(35): 77-79.  
NAL Call No.: 281.8 IN32  
Keywords: cow housing, barn roof design, ventilation, drinking water, cubicles, bedding, flooring, skin and foot care, Italy, Italian language.
- Vokey F.J., C.L. Guard, H.N. Erb, and D.M. Galton (2001). **Effects of alley and stall surfaces on indices of claw and leg health in dairy cattle housed in a free-stall barn.** *Journal of Dairy Science* 84(12): 2686-99, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: dairy herd, housing, alley surfaces, grooved concrete, rubber mats, free stall beds, deep sand, rubber mattresses, concrete, sawdust, hind claws, hocks, lesions, dorsal wall length, heel depth, toe angle, digital dermatitis, scoring.
- Wandel, H. and T. Jungbluth (1997). **Assessing new design of lying boxes for cows. [Bewertung neuer Liegeboxenkonstruktionen.]** *Landtechnik* 52(5): 266-267, ISSN: 0023-8082.  
NAL Call No.: 58.8 L235  
Keywords: dairy cows, housing, design, construction, costs, cubicles, boxes, husbandry, mats, floors, German language.
- Webster, A.J.F. (2001). **Effects of housing and two forage diets on the development of claw horn lesions in dairy cows at first calving and in first lactation.** *The Veterinary Journal* 162 (1): 56-65, ISSN: 1090-0233.  
NAL Call No.: SF601.V484  
Abstract: This paper describes a systematic study of the development of lesions of the claw horn (CHL, sole and white line) in heifers calving for the first time, housed either in cubicles or a straw yard and fed either a low- or high-dry-matter forage diet. The feet of all animals were inspected on five occasions, at approximately four weeks before and four, eight, 16 and 24 weeks post calving. Haemorrhagic lesions of the sole and white line were described according to a geometric lesion score for severity and a cumulative lesion score based on the product of (severity x area) for each lesion. Geometric and cumulative lesion scores increased in all groups of cattle in the first eight weeks after calving. However, the severity and persistence of the lesions were significantly greater in cattle housed in cubicle yards. Wet feeding increased the severity of CHL in the cubicle yard only. There were no associations between lesion scores and body weight, body condition or foot conformation. The heels of the cattle in straw yards tended to be thick but many showed pitting erosions. In cubicles the heels were smooth but thin. This may have contributed to CHL by increasing concussive forces within the hoof. There was a highly significant (but relatively low) correlation between scores for sole lesions and lameness in individual animals. These observations are consistent with the hypothesis that systemic events associated with calving and the onset of lactation may set in motion the chain of events that lead to the lesions of CHL; the extent and severity of these lesions being then determined by the externally imposed conditions of housing and feeding.  
Keywords: heifers, calving, lactation, cow housing, cubicles, straw yards, forage, dry matter, cattle

feeding, moisture, interactions, claws, lesions, body weight, body condition, risk factors, hemorrhage, conformation, feet, lameness, etiology.

Wiederkehr, T.U., K. Friedli, and B. Wechsler (2001). **Influence of regular outdoor exercise on occurrence and type of hock lesions of dairy cows kept in tied housing systems.** [Einfluss von regelmässigem Auslauf auf das Vorkommen und den Schweregrad von Sprunggelenksschaden bei Milchvieh im Anbindestall.] *KTBL-Schrift* 403: 163-170.

Keywords: dairy cows, disease prevention, exercise, joint diseases, hock lesions, lameness, exercise, lying area, litter, German language.

Wilson, L.L., T.L. Terosky, C.L. Stull, and W.R. Stricklin (1999). **Effects of individual housing design and size on behavior and stress indicators of special-fed Holstein veal calves.** *Journal of Animal Science* 77(6): 1341-1347, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: The objectives of this study were to determine effects of housing design (calves tethered in open stalls vs untethered in individual pens) and widths of 56, 66, and 76 cm (2 x 3 factorial arrangement of treatments) on indicators of stress and behavior in special-fed veal calves. Three production cycles (groups) were used, each with 36 Holstein bull calves. Calves (n = 108) were randomly allotted to treatments upon arrival at the facility. Blood samples were collected four times (wk 4, 9, 13, and 18) during the 18-wk production cycle. Blood serum values for cortisol and (alpha1)-acid glycoprotein (AGP) exhibited few treatment differences. Blood leukocyte differential counts at 4 and 18 wk (segmented neutrophils [N], banded neutrophils, lymphocytes [L], basophils, and the N:L ratio) were not different ( $P > .05$ ) among housing designs or widths. However, there were differences ( $P < .05$ ) in monocytes and eosinophils during the 28-d period after arrival; calves in stalls 76 cm wide had the greatest percentage of both leukocytes, and calves in the 66-cm stalls had the lowest monocyte percentage. Calves were recorded on videotape during wk 4, 13.5, and 18 to determine frequencies and durations of postures and behaviors (e.g., lying, standing, chewing, tongue playing, grooming, and investigative activities). There were no consistent differences ( $P > .05$ ) in postures or behaviors among calves in different housing designs or widths. Calves spent approximately 71 and 31% in lying and standing positions, with no preference for the right or left side while recumbent. There was a tendency for calves in wider stalls or pens at wk 9 and 18 to exhibit more self-grooming activities. Tongue playing and investigative and chewing activities were exhibited in all treatments, but no differences ( $P > .05$ ) were observed. However, calves housed in the 56-cm pens displayed difficulty in changing from lying to a standing position and were unable to extend one or more legs while recumbent. Even though there were few differences in behavioral, physiological, growth, or anatomical traits in this study, further increases in age and (or) weight of finished calves will require a reassessment of the appropriateness of individual veal calf housing design and dimensions.

Keywords: calves, young animals, Holstein, stress, veal calves, basophils, blood serum, hydrocortisone, eosinophils, glycoproteins, grooming, leukocytes, monocytes, neutrophils, tethered housing, cattle housing, animal welfare, animal experiments, hematology, blood chemistry, calf housing, stalls, pens, cubicles.

Yamamoto, S., B.A. Young, B.P. Purwanto, F. Nakamasu, and T. Matsumoto (1994). **Effect of solar radiation on the heat load of dairy heifers solar-radiation.** *Australian Journal of Agricultural Research* 45(8): 1741-1749.

NAL Call No.: 23 Au783

Keywords: dairy heifers, respiration rate, mean body temperature, effective temperature, heat load, solar radiation, thermoregulation, respiration rate, heat production, heart rate, shading, summer, autumn, equations.

Zahner, M., M. Keck, W. Langhans, B. Wechsler, and R. Hauser (2001). **Influence of weather protection in winter on ethological and physiological parameters in dairy cows.** [Einfluss von Witterungsschutz im Winter auf ethologische und physiologische Parameter bei Milchkühen.] *KTBL-Schrift* 403: 28-36.

NAL Call No.: 18 K96

Keywords: dairy cows, housing, cubicles, winter weather, cold, stress, body temperature, heart rate, milk cortisol.

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## Husbandry

Baumgartner, G. (1999). **General regulations for the humane husbandry of livestock. [Rahmenbedingungen für die tierschutzgerechte Haltung landwirtschaftlicher Nutztiere.]** *Zuchtungskunde* 71(1): 2-7, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: animal welfare, legislation, livestock, husbandry, Europe, German language.

Bazeley, K., G. Anderson, and A. Hibbert (2000). **Measurement of the quality of stockmanship.** *Cattle Practice* 8(1): 13-14, ISSN: 0969-1251.

NAL Call No.: SF961 C37

Keywords: stockmen, dairy cattle, cows, animal welfare, husbandry, United Kingdom.

Bewley, J., R.W. Palmer, and D.B. Jackson-Smith (2001). **An overview of experiences of Wisconsin dairy farmers who modernized their operations.** *Journal of Dairy Science* 84(3):717-29.

NAL Call No.: 44.8 J822

Keywords: farm expansion, modernization, production increase, herd size, milk production, labor efficiency, herd performance, profitability, labor management, financing, loan procurement, construction and cost overruns, feet and leg health.

Brade, W. (2001). **Comparison of automatic and conventional milking systems. [Automatische und konventionelle Melksysteme im Vergleich.]** *Berichte ueber Landwirtschaft* 79(2): 275-292, ISSN: 0005-9080.

NAL Call No.: 18 G31

Keywords: dairy cows, farmer, automatic milking system, cost effectiveness, milk collection method, milk quality, quality of life, German language.

Brade, W. (2001). **Precision farming in animal husbandry. [Precision farming in der tierischen Erzeugung.]** *Tierarztliche Umschau* 56 (11): 582-590, ISSN: 0049-3864.

NAL Call No.: 41.8 T445

Keywords: dairy farming, cattle feeding, machine milking, animal recognition, automatic data collection, German language.

Breuer, K., P.H. Hemsworth, J.L. Barnett, L.R. Matthews, and G.J. Coleman (2000). **Behavioural response to humans and the productivity of commercial dairy cows.** *Applied Animal Behaviour Science* 66(4): 273-288, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: dairy cattle, cows, productivity, attitudes, stockmen, dairy farms, animal behavior, fearfulness, vocalization, stress response, trauma, animal welfare, milk yield, milkers, milk yield, milk protein, milk yield, milk fat.

Buchwalder, T., T. Oswald, and B. Wechsler (1999). **Alternatives to the cow trainer: evaluation of cow behaviour when using the Albrecht iron and the aktorik. [Alternativen zum elektrischen Kuhtrainer: Beurteilung des Verhaltens der Kuhe unter dem Albrecht-Bugel und unter der Aktorik.]** *Eidgenossische Forschungsanstalt für Agrarwirtschaft und Landtechnik (FAT)*, Switzerland, No. 535, 8p., ISSN: 1018-502X.

NAL Call No.: S671.B55

Keywords: cows, restraint of animals, housing, animal behavior, animal welfare, movement, electric current, cow trainers, equipment, waste disposal, cattle manure, Switzerland, German language.

Choi, D.Y., H.T. Kim, D.W. Lee, J.D. Han, H.S. Kang, D.J. Kwon, and S.K. Lee (2001). **A computer vision system for weighing dairy cows.** *Journal of Animal Science and Technology* 43 (1): 131-138.

NAL Call No.: SF1.H36

Keywords: Holstein Friesian, breed, dairy cows, body weight, computer vision system, pixel values of images, top and side view of dairy cow, cameras, personal computer, effect of light reflection, dark illumination.

Davis, S.R., V.C. Farr, and K. Stelwagen (1999). **Once-daily milking of dairy cows: an appraisal.** In: *59th conference, Holy Cross College, Mosgiel, 28 June-1 July 1999*, Vol.59, p.36-40, Dairy Science Group, AgResearch, Ruakura Research Centre: Hamilton, New Zealand.

Keywords: milking, cows, milk quality, milk yield, milking interval, costs, economics, productivity, milk composition, cow comfort, animal welfare.

Devir, S., J.P.T.M. Noordhuizen, and P.J.M. Huijsmans (1996). **Validation of a daily automatic routine for dairy robotic milking and concentrates supply.** *Journal of Agricultural Engineering Research* 64(1): 49-60, ISSN: 0021-8634.

NAL Call No.: 58.8 J82

Keywords: automatic system, diet, concentrate supplementation, Freisian-Holstein, breed.

Eicher, S.D., J.L. Morrow-Tesch, J.L. Albright, J.W. Dailey, C.R. Young, and L.H. Stanker (2000). **Tail-docking influences on behavioral, immunological, and endocrine responses in dairy heifers.** *Journal of Dairy Science* 83(7): 1456-1462, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: Behavioral and physiological changes were measured following tail-docking in primiparous heifers. One month before projected first parturition, 21 heifers were assigned to control (nondocked), docked, or docked with lidocaine groups. Heifers were banded to initiate taildocking and the necrotic tail was removed after 144 h. Physiological, immunological, and behavioral measures were taken for 240 h following banding. Cortisol was not different for control and treated heifers. Haptoglobin increased for docked heifers by 168 h postbanding (24 h postdocking). alpha1-Acid glycoprotein decreased as haptoglobin increased, and alpha1-acid glycoprotein increased until 240 h postbanding. Tumor necrosis factor-alpha increased only with lidocaine and did not show an effect of docking by 240 h postbanding. Lymphocyte phenotyping demonstrated increased CD4+ and CD8+ peripheral blood mononuclear cells for docked plus lidocaine heifers and gammadelta+ cells of those heifers tended to be reduced compared with docked heifers. Eating was the only maintenance behavior affected by banding in both docked groups (increased with banding and decreased with docking). The initial banding procedure did not alter heifer physiology and altered only eating behavior, but the cutting of the tail (docking) increased haptoglobin in response to the tissue damage and turned eating behavior to baseline. The use of lidocaine to anesthetize the tail before banding affected lymphocyte phenotypes and TNF-alpha (banding alone did not alter these parameters).

Keywords: heifers, animal behavior, docking, feeding behavior, haptoglobins, hydrocortisone, lidocaine, lymphocytes, stress, tail, tumor necrosis factor.

Fossing, C., M. Vaarst, C.M. Christensen, S.M. Thamsborg, E.M. Vestergaard, C.L. Ingvarsten, T.W. Bennedsgaard (2001). **Improving welfare in organic dairy cattle.** In: *Human Animal Relationship: Stockmanship and Housing in Organic Livestock Systems. Proceedings of the Third NAHWOA Workshop, Clermont-ferrand, France, 21-24 October 2000*, M. Hovi and M. Bouilhol, eds., p.151, Network for Animal Health and Welfare in Organic Agriculture, University of Reading: Reading, UK, ISBN: 0-7049-1094-2.

Keywords: animal welfare, coccidiosis, parasites, dairy cattle, homeopathy, organic farming.

- Frazzi, E. (2001). **How to adapt the stable to the milking robot. [Come adattare la stalla al robot di mungitura.]** *Informatore Agrario* 57(18): 58-62, ISSN: 0020-0689.  
NAL Call No.: 281.8 IN32  
Keywords: dairy cows, animal welfare, dairy farming, machine milking, milking machines, milking robots, comfort, design, milking parlors, movement of cows, Italian language, Netherlands.
- Fuchs, C. (2001). **Economic efficiency of intensive and extensive animal husbandry. [Okonomischer Nutzen von extensiver und intensiver Tierproduktion.]** *Praktische Tierarzt* 82(8): 578-585, ISSN: 0032-681X.  
NAL Call No.: 41.8 P882  
Keywords: agricultural economics, animal welfare, beef cattle, dairy cattle, swine, climate, grazing, intensive husbandry, housing, straw handling, labor costs, research, German language.
- Gobbel, T. (1998). **Opportunities only for big farms with best performance: milk production in Wisconsin. [Chance nur für große Betriebe mit Hochleistungen: Milchproduktion in Wisconsin.]** *Milchpraxis* 36(4): 196-199, ISSN: 0026-3753.  
NAL Call No.: SF221 M5  
Keywords: dairy farms, milk production, milking techniques, nutrition, animal welfare, cattle feeding, machine milking, milk prices, cows, German language.
- Fuhrmann, T. (2001). **Dairy heifer replacements: Caring for the future.** *Journal of the American Veterinary Medical Association* 219(10): 1387-1388, ISSN: 0003-1488.  
NAL Call No.: 41.8 Am3  
Keywords: National Animal Health Monitoring System; animal welfare, herd size, ethics.
- Giovannini, G., and A. Zecconi (2001). **Tools of production and health management: autocontrol in dairy cattle rearing. [Come strumento di produzione e di gestione sanitaria: l'autocontrollo negli allevamenti bovini.]** *Informatore Agrario* 57(19): 67-69, ISSN: 0020-0689.  
NAL Call No.: 281.8 IN32  
Keywords: health, dairy cattle, dairy industry, farm management, guidelines, livestock, mastitis, milk products, sanitary risks, monitoring, productivity, quality controls, Italian language.
- Graham, M.H.(2001). **Voltage compensation circuit and method for reducing electric shocks to teats of an animal during its milking.** *Official Gazette of the United States Patent and Trademark Office Patents* 1246(4): Pagination May 22, 2001, Patent Number: US 6234108, ISSN: 0098-1133.  
NAL Call No.: T223 A21  
Keywords: dairy cow, equipment, milk pipeline, milk stream, method for reducing electric shocks to cows during milking.
- Hamann, J. (2001). **Actual aspects on automatic milking systems. [Aktuelle Aspekte zum Einsatz automatischer Melkverfahren.]** *DTW Deutsche Tierärztliche Wochenschrift* 108 (3): 110-112.  
NAL Call No.: 41.8 D482  
Keywords: dairy cows, automatic milking systems, working conditions, quality of life of the dairy farmer, performance status of the cow, milk quality, milk hygiene regulations, udder health, German language.
- Hamann, J., V. Bronzo, P. Moroni, A. Casula, and A. Zecconi (2001). **Conventional and positive pressure pulsation effects on bovine teats and on immunological components of different milk fractions.** *Milchwissenschaft* 56 (8): 423-427.  
NAL Call No.: 44.8 M5933  
Keywords: physical forces, mechanical milking, changes in the teat tissue, blood circulation, cell population, teat tissue immune status, positive pressure milking system, conventional milking unit, relationship between machine milking and changes in differential cell counts.

Heissenhuber, A., and H. Hoffmann (2001). **Intensive or extensive milk production? [Intensive oder extensive Milcherzeugung?]** *Zuechtungskunde* 73(6): 422-429, ISSN: 0044-5401.

NAL Call No.: 49 Z8

Keywords: agricultural intensity, building costs, environmental incentives, extensive milk production, farm management, farming efficiency, feed costs, forage costs, intensive milk production, location quality, organizational intensity, price-cost ratio, German language, Germany.

Hill, J. (2001). **Dairy research in New Zealand.** *Milchwissenschaft* 56(9): 484-487, ISSN: 0026-3788.

NAL Call No.: 44.8 M5933

Keywords: animal health, welfare, dairy foods, dairy product, dairy research, food ingredients, food processing, genetics, research and development, literature review.

Hogeveen, H., W. Ouweltjes, C.J.A.M de Koning, and K. Stelwagen (2001). **Milking interval, milk production and milk flow-rate in an automatic milking system.** *Livestock Production Science* 72(1-2): 157-167, ISSN: 0301-6226.

NAL Call No.: SF1 L5

Keywords: milking robot, automatic milking, voluntary visits by cow, milk flow rate, milking interval, milk production, variation, udder health.

Hopster, H., J.T.N. van der Werf, J.H.F. Erkens, H.J. Blokhuis (March 1999). **Effects of repeated jugular puncture on plasma cortisol concentrations in loose-housed dairy cows.** *Journal of Animal Science* 77(3): 708-714, ISSN: 0021-8812.

NAL Call No.: 49 J82

Abstract: In three experiments, the effects of venipuncture on plasma cortisol concentrations were studied in loose-housed dairy cows. In Exp. 1, two blood samples were collected 18 min apart on three alternate days from 20 dairy cows for studying their adrenocortical response to a single venipuncture. To further evaluate the effect of cows anticipating venipuncture, in Exp. 2, 15 dairy cows were sequentially venipunctured once daily on 12 successive days in a randomized order in groups of five, starting 15 min apart. In Exp. 3, 10 primiparous cows were used on three alternate days to study habituation to serial sampling (i.e., collection of first blood samples by venipuncture, 15min apart). In cows accustomed to handling, jugular puncture did not affect cortisol concentrations in plasma collected 18 min later. Average daily cortisol concentrations varied between 2.07 +/- .38 and 3.81 +/- .56 ng/mL in the first (t = 0) and between 1.43 +/- .15 and 2.61 +/- .72 ng/mL in the second (t = 18) blood samples. Likewise, when cows were sampled sequentially once a day, the order of sampling between and within groups did not influence (P > .05) plasma cortisol concentrations. In contrast, primiparous dairy cows that were less used to being handled showed an average increase in cortisol concentrations when five samples were collected by venipuncture 15 min apart. During successive sampling sessions, however, the cows did not decrease or increase plasma cortisol concentrations in response to repeated serial sampling at the group level (P > .05). Between individuals, the maximum effect of repeated venipuncture on cortisol concentrations (4.5 to 22.6 ng/mL), the time at which the effect reached its maximum (30 to 60 min), and the consistency of the response pattern over successive series varied largely. The results of this study show that in cows that were accustomed to the handling and to being restrained, baseline cortisol concentrations can be measured in single blood samples that are collected by jugular puncture within 1 min after first approaching the cow. When successive blood samples need to be collected within 15 to 20 min, jugular puncture may induce an increase in cortisol concentration, which seems to depend on the handling experience of the animals and on individual differences.

Keywords: dairy cows, blood chemistry, blood plasma, hydrocortisone, stress, jugular vein, acclimatization, animal welfare.

Ipema, A.H. (1997). **Integration of robotic milking in dairy housing systems. Review of cow traffic and milking capacity aspects.** *Computers and Electronics in Agriculture* 17(1): 79-94, ISSN: 0168-1699.

NAL Call No.: S494.5 D3C652

Keywords: milking, housing systems, review, cow integration.

- Jago, J.G., C.C. Krohn, and L.R. Matthews (Feb. 15, 1999). **The influence of feeding and handling on the development of the human-animal interactions in young cattle.** *Applied Animal Behaviour Science* 62(2/3): 137-151, ISSN: 0168-1591.  
NAL Call No.: QL750  
Keywords: calves, artificial rearing, feeding, handling, approach behavior, group size, liveweight gain.
- Kashiwamura, F., J. Suda, K. Furumura, S. Hidaka, T. Seo, and T. Iketaki (2001). **Habituation training for dairy cattle to milking boxes of new installed automatic milking system.** *Animal Science Journal* 72 (8): J266-J273, ISSN: 1344-3941.  
NAL Call No.: SF1 A542  
Keywords: cows, Holstein, breed, training of cows to enter milking boxes, automatic milking system, conventional stanchion stall barn, free stall barn, entrance gate, alley, three tandem milking boxes, parameters observed, duration of passing through the entrance gate, duration from passing the gate to entering into a milking box, score of training difficulty, number of trainings required for the cows to enter the milking box without difficulty.
- Kjaestad, H.P., and E. Simensen (2001). **Management of calving in Norwegian cubicle-housed dairy herds.** *Acta Veterinaria Scandinavica* 42 (1): 131-137, ISSN: 0044-605X.  
NAL Call No.: 41.8 AC87  
Keywords: animal housing, calves, calving, cows, dairy cows, management, location of the cow when giving birth, farmer presence, assisted births, suckling, time after birth when cow and calf were separated, cubicles, pasture, calving pens, tethered cows, calf injuries, sheds, surveys, Norway.
- Kotting, C., H. Seufert, H.P. Schwarz, and J. Hesse (1999). **Milking and milking technique in the USA. [Melkverfahren und Melktechnik in den USA.]** *Milchpraxis* 37(1): 26-28, ISSN: 0026-3753.  
NAL Call No.: SF221 M5  
Keywords: dairy farms, cows, milking, milking machines, udders, cleaning, movement, human behavior, animal behavior, milking parlors, automation, milkers, techniques, German language.
- Krohn, C.C. (2001). **Effects of different suckling systems on milk production, udder health, reproduction, calf growth and some behavioural aspects in high producing dairy cows: a review.** *Applied Animal Behaviour Science* 72 (3): 271-280, ISSN: 0168-1591.  
NAL Call No.: QL750.A6  
Keywords: dairy cows, calves, different suckling systems, industrial countries, milk production, udder health, reproduction, behavior, gain, health, suckling systems, long term suckling, short term suckling, colostrum period, restricted versus free suckling systems, suckling decreases the risk of mastitis, post partum interval.
- Lawson, T.J., and A.D. Kennedy (2001). **Inhibition of nighttime melatonin secretion in cattle: threshold light intensity for dairy heifers.** *Canadian Journal of Animal Science* 81 (1): 153-156.  
NAL Call No.: 41.8 C163  
Keywords: heifers, Holstein, breed, melatonin secretion, lower light intensities, plasma melatonin concentrations.
- Ledin, I. and A. Lema (1996). **An eye for the animals: a necessary competence in Swedish milk production?** In: *Livestock Farming Systems: More than Food Production. Proceedings of the 4th International Symposium, Foulum, Denmark, August 22-23, 1996*, J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands, p. 106-113, ISSN: 9-07-413449-1.  
NAL Call No.: 49.9 Eu7 no.89  
Keywords: dairy farming, cows, husbandry, animal welfare, milk production, farmers' attitudes, farmer interviews, Sweden.
- Lewis, N.J. and J.F. Hurnik (1998). **The effect of some common management practices on the ease of handling of dairy cows.** *Applied Animal Behaviour Science* 58(3): 213-230, ISSN: 0168-1591.

NAL Call No.: QL750.A6

Keywords: management, temperament, animal behavior, handling, human-animal interactions.

Masoero, G., G. Bergoglio, C.F. Cereti, and L. Cialie Rosso (1996). **Stocking rate on pasture and productive response of Valdostana Red Pied and Piedmont cattle for veal or milk production. [Intensita di carico al pascolo e risposte produttive da bovine Valdostane p.r. e Piemontesi munte o allattanti.]** *Rivista di Agronomia* 31(Supplement 1): 337-340, ISSN: 0035-6034.

NAL Call No.: S9.R58

Keywords: dairy cows, nursing cows, Red Pied and Piedmont, breed, stocking rate, high, low, milk, milk yield, veal, pastures, Italy, Piedmont, Italian language.

Mauries, M., G. Allard, J.C. Emile, D. Parent, D. Pellerin, and F. Sarrazin (1998). **Producing organic milk: making the transition successfully. [Produire du lait biologique: reussir la transition.]** Editions France Agricole: Paris, France, 192p., ISBN: 2-85-557039-5.

Keywords: organic farming, farm management, dairy farms, monitoring, ecosystems, soil, fertilizers, grasslands, grassland management, soil amendments, rotations, regulations, farmers' associations, cost analysis, conflict, animal welfare, book, French language, France, Quebec, Canada.

Mayntz, M., R. Sederstrom, and G. Sender (2001). **Quantitative effect of after milking stimulation on milk yield and fat composition in dairy cattle.** *Acta Agriculturae Scandinavica Section A Animal Science* 51 (2): 107-113, ISSN: 0906-4702.

NAL Call No.: S3 A27

Keywords: cows, Swedish Red and White, breed, milking stimulation, pushes towards the teat base, hand milking bouts, milk yield, blood serum, fat content, fatty acids,

Morita, S., K. Uetake, S. Shimizu, K. Yayou, S. Kume, T. Tanaka, and S. Hoshihara (2001). **Evaluation of routine rearing work for human animal interactions in commercial dairy farm.** *Journal of Rakuno Gakuen University Natural Science* 25 (2): 263-269.

NAL Call No.: QH7 J68

Keywords: stockperson's working position, human animal relationship, contact with cows, flight distance.

Munksgaard, L., A.Md. Passille, J. Rushen, K. Thodberg, and M.B. Jensen (1997). **Discrimination of people by dairy cows based on handling.** *Journal of Dairy Science* 80(6): 1106-1112, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: This study examined whether dairy cows could distinguish among people based on the treatment received, whether cows used color as a cue to make this discrimination, and whether cows generalized their discrimination to other locations. Twelve cows were each repeatedly treated in a special treatment stall by two people wearing red or yellow overalls. One person always treated the cows aversively, and the other always treated them gently. The distance between each person and each cow in the home stall and in the treatment stall was scored during tests. Before treatment, the distances that cows maintained from the two people were uncorrelated, and the distances that they maintained in the treatment stall were uncorrelated with those in the home stall. Before and after treatments, the cows stood further from the handlers in the treatment stall than in the home stall, regardless of color of the overalls. Defecation and urination were more frequent during aversive treatments. After treatment, the cows stood further from the aversive handler than from the gentle handler in both stalls, and distance from the aversive handler was positively correlated with distance from the gentle handler. The cows did not discriminate when the aversive and gentle handlers wore blue overalls (as worn by the usual barn handlers), when two unfamiliar people wore the same color overalls as the handlers, or when the cows were shown photographic slides of the two handlers. In conclusion, the cows learned to discriminate among the handlers, partially based on the color of the clothes worn. This discrimination was generalized to another location.

Keywords: cows, breed, Friesian, husbandry, animal welfare, stress, animal behavior, stockmen, color of clothes worn, discrimination, rough versus gentle handling, Denmark.

- Norman, H.D., J.L. Edwards, J.R. Wright (2001). **Accuracy of recorded birth and calving dates of dairy cattle in the United States.** *Journal of Dairy Science* 84(9): 2089-2096, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: husbandry, record keeping, birth recording, accuracy, calving dates, cow age, herd size, standardized yield, fitness records, genetic evaluations, USA.
- Ordolff, D. (2001). **Introduction of electronics into milking technology.** *Computers and Electronics in Agriculture* 30 (1-3): 125-149.  
NAL Call No.: S494.5.D3C652  
Keywords: machine milking, milk flow, application of electricity, electronic components, sensors, control units, teat cups, automatic checks of udder condition, milk quality, on line milk analysis, dairy farmer, technology, former German Democratic Republic,
- Paranhos da Costa, M.J.R. and D.M. Broom. (2001). **Consistency of side choice in the milking parlour by Holstein-Friesian cows and its relationship with their reactivity and milk yield.** *Applied Animal Behaviour Science* 70 (3): 177-186, ISSN: 0168-1591.  
NAL Call No.: QL750.A6  
Keywords: dairy cows, Holstein-Friesian, breed, behavior, temperament, milking, milking parlors, milk yield, animal welfare, milking side preferences.
- Ruegg, P.L. (2004). **Tail docking and animal welfare.** *Bovine Practitioner* 38(1): 24-29.  
NAL Call No.: SF779.5 A1B6  
Abstract: Tail docking is a common practice on many dairy farms, and is perceived by many farmers to improve cleanliness and enhance milking parlour efficiency. It is a controversial practice attracting increasing scrutiny by the animal welfare community. Scientific studies have been performed to evaluate physiological and behavioural responses to tail docking in preweaned calves and preparturient heifers. The effect of tail docking on animal behaviour, indicators of pain, fly avoidance behaviours, immune responses and circulating plasma cortisol have been reported. Additional studies have been performed to evaluate the effect of tail docking on cleanliness and udder health in lactating dairy cows. The purpose of this paper is to review current research related to tail docking in dairy cattle.  
Keywords: animal behavior, husbandry, animal welfare, blood chemistry, calves, dairy cows, heifers, hygiene, docking, hydrocortisone, immune response, pain, surgery, tail, udders.
- Reubold, H. (1999). **Automatic water dispensers tested by the DLG. [DLG-geprüfte Selbsttranken.]** *Milchpraxis* 37(3): 148-153, ISSN: 0026-3753.  
NAL Call No.: SF221 M5  
Keywords: livestock, drinkers, design, installation, water troughs, bowl drinkers, dispensers, testing, characteristics, evaluation, Germany, German language.
- Rossing, W, E. Aurik, and W. Smit (1998). **Robot milking systems and the integration in the dairy farm: Automatic Milking.** In: *Proceedings of the Fourth International Dairy Housing Conference, St. Louis, Missouri, USA, January 28-30, 1998*, J.P. Chastain (ed.), American Society of Agricultural Engineers (ASAE): St Joseph, USA, p. 61-70, ISSN: 0-92-935589-X.  
NAL Call No.: SF506 I58 1998  
Keywords: dairy cows, automatic milking system design, social aspects, animal welfare, milk yield, milk quality, milking interval, individual cow management.
- Rossing, W., P.H. Hogewerf, A.H. Ipema, C.C. KetelaarDeLauwere, and C.J.A.Md. Koning (1997). **Robotic milking in dairy farming.** *Netherlands Journal of Agricultural Science* 45(1): 15-31, ISSN: 0028-2928.  
Keywords: cows, milk yield, animal welfare, labor, dairy farming, robots, automation, machine milking, milking parlors, dairy farms, reviews, Netherlands.
- Sandoe, P., L. Munksgaard, N.P. Badsgard, and K.H. Jensen (1996). **How to manage the management factor: assessing animal welfare at the farm level.** In: *Livestock Farming Systems: More than Food Production. Proceedings of the 4th International Symposium*, Foulum, Denmark, August 22-23, 1996,

J.T. Sorensen (ed.), Wageningen Pers: Wageningen, Netherlands, p. 221-230, ISSN: 9-07-413449-1.

NAL Call No.: 49.9 Eu7 no.89

Keywords: dairy cattle, dairy farms, animal welfare assessment, effects of management, reviews.

Schon, H. and G. Wendl (2000). **Precision animal husbandry. [Rechnergestutzte Tierhaltung.]** *Landtechnik* 55(3): 238-239, ISSN: 0023-8082.

NAL Call No.: 58.8 L235

Keywords: animal welfare, intensive husbandry, precision agriculture, data records, computer-aided methods, individual electronic animal identification, feeding, resting, milking, costs, dairy farms, husbandry, German language.

Schreiner, D.A. and P.L. Ruegg (2002). **Effects of tail docking on milk quality and cow cleanliness.** *Journal of Dairy Science* 85 (10): 2503-2511, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: The objective of this study was to determine the effect of tail docking on somatic cell count (SCC), intramammary infection (IMI), and udder and leg cleanliness in commercial dairy herds. Lactating dairy cows (n = 1250) from eight Wisconsin farms were blocked by farm and randomly allocated to tail docked (D) or control (C) groups. Milk samples, somatic cell counts, and hygiene scores were collected for 8 to 9 mo. The prevalence of IMI was determined for each of the five occasions when milk samples were obtained. Udder and leg cleanliness were assessed during milk sample collection. Docked and control animals were compared by logSCC, prevalence of IMI, and leg and udder cleanliness score. Variables were analyzed according to all treatment, period, and farm interactions. At the end of the study period 76 (12.2%) and 81 (13%) of cows were culled in the D and C groups, respectively. There were no significant differences in the initial data for parity, daily milk yield, logSCC, or DIM between treatment groups. Effects significant to farms were identified for all variables over all periods. Period was significant for all variables except for the prevalence of environmental pathogens, but no period x treatment interactions were detected. There was no significant difference between treatment groups for somatic cell count. The prevalence of contagious, environmental, or minor pathogens did not differ significantly between treatment groups. This study did not identify any differences in udder or leg hygiene or milk quality that could be attributed to tail docking.

Keywords: dairy cows, tail docking, somatic cell count, milk, hygiene, udders, legs, bovine mastitis, pathogens, contagious pathogens, environmental pathogens, stalls, Wisconsin.

Schreiner, D.A. and P.L. Ruegg (2002). **Responses to tail docking in calves and heifers.** *Journal of Dairy Science* 85 (12): 3287-3296, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Abstract: The primary objective of this study was to determine the behavioral and physiological effects of tail banding and atrophy using rubber rings 2 to 4 mo before first parturition in dairy heifers either with or without the use of epidural anesthesia. The secondary objective was to determine behavioral responses to tail banding using rubber rings in calves 7 to 42 d of age. Preparturient heifers (n = 24) were randomly assigned to one of four treatment groups: 1) tails were cleaned and handled; 2) tails were cleaned, handled, and an elastrator band was applied to the tail; 3) an epidural was administered 15 min before cleaning and handling; and 4) an epidural was administered 15 min before application of an elastrator band. Behavioral observations and physiological responses were collected for 6 wk.

Additionally, behavioral responses to tail banding were recorded for 10 d on Holstein heifer calves that were 1 to 6 wk of age (n = 40). No significant differences in behavior were observed among treatment groups of preparturient heifers at any time during the 6-wk observation period. Preweaned calves that were 21 to 42 d of age demonstrated significantly more restlessness after application of tail bands compared to younger calves or control calves of the same age. Plasma cortisol values of preparturient heifers remained within limits previously described for nonstressed animals and no significant differences were detected among groups. Hematological values remained within the reference values for cattle, and there were no significant differences between groups except for relatively more eosinophils in the heifers that received epidurals. No significant differences in heart rate or body temperature were detected among groups.

Keywords: calves, heifers, tail docking, tail banding, behavior, posture, pain, conduction anesthesia, age differences, blood plasma, hydrocortisone, blood picture, heart rate, body temperature, animal welfare.

Seabrook, M.F. (1994). **Psychological interaction between the milker and the dairy cow.** *National Mastitis Council Annual Meeting* 163-174, ISSN: 0271-9967.

NAL Call No.: SF967.M3N32

Keywords: psychology, human animal interactions, man, perception, animal welfare.

Smolders, G. (2001). **Animal management on organic dairy farms.[Diermanagement op biologische melkveebedrijven.]** *Praktijkonderzoek Rundvee* 14(4): 31-36, ISSN: 1569-805X.

Keywords: dairy cows, age at first calving, age at first insemination, health, body condition, breeds, housing, dairy farming, farm management, fertility, milk, milk production, organic farming, somatic cell count, Dutch language, Netherlands.

Sorensen, A., D.D. Muir, and C.H. Knight (2001). **Thrice-daily milking throughout lactation maintains epithelial integrity and thereby improves milk protein quality.** *The Journal of Dairy Research* 68 (1): 15-253, ISSN: 0022-0299.

NAL Call No.: 44.8 J823

Abstract: Cows managed for extended lactations of 16 months duration were milked on a half-udder basis twice or thrice daily, commencing in lactation week 9. Mammary epithelial integrity (assessed by milk sodium:potassium ratio) was greater in the half-udder which was milked thrice daily. This difference was evident throughout the lactation but became greater after week 41. Milk protein composition was assessed during late lactation (52 $\pm$ 3 weeks). Casein number (casein as a proportion of total protein) was significantly higher in half-udders milked thrice daily, as were the relative amounts of alpha- and beta-caseins, whilst those of kappa- and gamma-caseins were reduced. Two days of inverted milking frequency (i.e. thrice-milked udder halves now milked twice, and vice versa) only partly reversed these difference. We concluded that thrice-daily milking will help to prevent or ameliorate the usual decline in milk processing quality associated with late lactation. Part of this effect is due simply to reduced exposure to proteolytic enzymes as a result of decreased storage time in the udder, but part is due to a better maintenance of epithelial tight junction integrity as lactation advances, which restricts leakage of proteolytic enzymes from serum into milk.

Keywords: dairy cows, milking, lactation, frequency, epithelium, milk protein, protein quality, milk composition, animal husbandry, sodium, potassium, ratios, mammary glands, protein composition, alpha-casein, beta-casein, gamma-casein, kappa-casein, processing quality, temporal variation.

Srairi, M.T., and M. El Khattabi (2001). **Economical and technical performance of an intensive dairy cattle barn in a semi-arid zone in Morocco. [Evaluation economique et technique de la production laitiere intensive en zone semi aride au Maroc.]** *Cahiers Agricultures* 10 (1): 51-55.

NAL Call No.: S5 C34

Keywords: cows, Holstein, breed, economic profitability, intensive dairy cattle barn, breeding practices, seasonally dependent, weather changes, rainfall, drought, semi arid zone, availability of forage, milk yields, concentrates, artificial insemination, natural mating, calf mortality rate, production costs, feed costs, Morocco.

Stonehouse, D.P., E.A. Clark, and Y.A. Ogini (2001). **Organic and conventional dairy farm comparisons in Ontario, Canada.** *Biological Agriculture and Horticulture* 19 (2): 115-125, ISSN: 0144-8765.

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NAL Call No.: SF196 U6D35 1993

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Keywords: breed, Holstein cows, heifers, Early Conception Factor (ECF) test, commercially available qualitative assay, pregnancy detection, glycoprotein, bovine serum, conception, embryonic loss, false positive results, blood sampling, unreliable method.

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Keywords: dairy cows, embryo transfer, female fertility, pregnancy rate, animal welfare, stress.

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Keywords: dairy cows, heifers, crossbred, hormonal treatment, GnRH agonist, buserelin, embryo transfer, pregnancy rate, progesterone in bovine embryo recipients, plasma concentrations, blood collection pregnancy diagnosis, transrectal way.

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NAL Call No.: SF1 L5

Keywords: linear based, non linear based, analysis method for lactation curves, effects of calving season, total milk yield, milk composition, autumn and spring calved cows, seasonal variation.

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NAL Call No.: 44.8 J822

Keywords: Holstein, breed, cows, dairy herd improvement test day data, commercial dairy herds, milk urea concentrations, infrared test method, reproductive performance, fertility pregnancy, insemination, nitrogen excretion.

Guzeloglu, A., J.D. Ambrose, T. Kassa, T. Diaz, M.J. Thatcher, and W.W. Thatcher (2001). **Long-term follicular dynamics and biochemical characteristics of dominant follicles in dairy cows subjected to acute heat stress.** *Animal Reproduction Science* 66 (1/2): 15-34, ISSN: 0378-4320.

NAL Call No.: QP251.A5

Keywords: dairy cows, ovarian follicles, heat stress, estrus, quality, progesterone, prostaglandins, air temperature, body temperature, follicular fluid, heat shock proteins, molecular weight.

Hansen, P.J. and C.F. Arechiga, (1999). **Strategies for managing reproduction in the heat-stressed dairy cow.** *Journal of Animal Science* 77(Suppl. 2): 36-50.

NAL Call No.: 49 J82

Abstract: Establishment and maintenance of pregnancy is difficult in lactating dairy cows exposed to heat stress because of reductions in estrous detection rate and the proportion of inseminated cows that

maintain pregnancy. The most common approach to ameliorate heat stress in developed countries has been to alter the cow's environment through provision of shade, fans, sprinklers, and so on. Nonetheless, seasonal variation in reproductive function persists. Increased understanding of bovine reproductive function and its alteration by heat stress has led to additional strategies for reducing deleterious consequences of heat stress on reproduction. These include hormonally induced timed artificial insemination, which can reduce losses in reproductive efficiency caused by poor detection of estrus, and embryo transfer, which can increase pregnancy rate by allowing embryos to bypass the period when they are most sensitive to elevated temperature (i.e., in the first 1 to 2d after breeding). Other efforts are directed toward developing methods to protect the embryo from harmful actions of elevated temperature. Approaches being studied include manipulation of embryonic synthesis of heat shock proteins and use of antioxidants to reduce free radical damage associated with heat stress. It may also be possible to reduce the magnitude of hyperthermia caused by heat stress. This might be possible physiologically, for example by feeding of agents that affect thermoregulatory systems, or genetically by selecting for specific traits conferring thermal resistance. Finally, the development of bovine somatotropin as a lactational promotant means that it may be possible to extend lactations beyond 305 d and voluntarily discontinue inseminations during periods of heat stress.

Keywords: dairy cows, heat stress, lactation, body temperature, body temperature regulation, estrus detection, postpartum interval, pregnancy rate, embryo mortality, uterus, oviducts, spermatozoa, heat shock, genetic resistance, embryo transfer, literature reviews.

Hansen, P.J., M. Drost, R.M. Rivera, F.F. Paula-Lopes, Y.M. Al-Katanani, C.E. Krininger, and C.C. Chase (2001). **Adverse impact of heat stress on embryo production: causes and strategies for mitigation.** *Theriogenology* 55 (1): 91-103.

NAL Call No.: QP251 A1T5

Keywords: dairy cows, beef cows, body temperature regulation, superovulation.

Hernandez, J., J.K. Shearer, and D.W. Webb (2001). **Effect of lameness on the calving to conception interval in dairy cows.** *Journal of the American Veterinary Medical Association* 218 (10): 1611-1614, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: lactating dairy cows, lameness, reproductive performance, interval from calving to conception, number of breedings required per conception, foot rot, papillomatous digital dermatitis, claw lesions, multiple lesions.

Hernandez, C.J. and R.J.S. Morales (2001). **Conception failure in dairy cattle: Evaluation of hormone therapies.** [Falla en la concepcion en el ganado lechero: Evaluacion de terapias hormonales.] *Veterinaria Mexico* 32(4): 279-287, ISSN: 0301-5092.

NAL Call No.: SF604.V485

Keywords: bovine somatotrophin, human chorionic gonadotropin, progesterone, conception rate, fertility, milk production, pregnancy, mortality, early embryonic death, repeat breeder cows.

Heuer, C., Y.H. Schukken, L.J. Jonker, J.I.D. Wilkinson, and J.P.T.M. Noordhuizen (2001). **Effect of monensin on blood ketone bodies, incidence and recurrence of disease and fertility in dairy cows.** *Journal of Dairy Science* 84 (5): 1085-1097, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: effect of monensin, milk production, health, reproduction, calving, clinical mastitis, intramammary infection, lameness, calving to conception intervals, endometritis, cystic ovarian disease.

Holmes, C.W. (2001). **Managing fertility in the New Zealand dairy herd.** *Proceedings of the New Zealand Society of Animal Production* 61:135-140, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: dairy cows, body condition, feeding, fertility, genetics, health, lactation, milk products, milk yield, reviews, New Zealand.

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Keywords: activity, estrus-detection, tie-stall, reproduction.
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NAL Call No.: QP251 A5  
Keywords: robot milking, fertility, sexual reproduction, lactation, energy balance, fecundity, husbandry, feed rations, live weight, weight loss, body condition.
- Kumar, H., S. Mahmood, and L.P. Singh (2001). **Treatment of placental retention with ecboic drugs and its effect on subsequent fertility in crossbred cows.** *Indian Journal of Animal Sciences* 71 (7): 654-657.  
NAL Call No.: 41.8 IN22  
Keywords: cows, fertility response, retained fetal membranes, ecboic drugs, intrauterine infusion, oriprim bolus, synotocinon, luprostiol, estradiol valerate, herbal drug, metrali, reproductive efficiency, interval from parturition to conception, number of services per conception.
- LeBlanc, S. (2001). **The Ovsynch breeding program for dairy cows: a review and economic perspective.** *Bovine Practitioner* 35 (1): 13-22.  
NAL Call No.: SF779.5 A1B6  
Keywords: program for synchronization of ovulation (Ovsynch), heat detection, reproductive performance, artificial insemination, economic impact, literature review.
- Lucy, M.C. (2001). **Reproductive loss in high producing dairy cattle: where will it end?** *Journal of Dairy Science* 84 (6): 1277-1293, ISSN: 0022-0302.  
NAL Call No.: 44.8 J822  
Keywords: dairy industry, milk production per cow, steady increase, improved management, better nutrition, intense genetic selection, larger herd size, reproductive physiology control of the estrous cycle, metabolic effects of lactation on reproduction, mechanisms linking disease to reproduction, early embryonic mortality, infertility, United States.
- Mahmoudzade, A.R., M Tarahomi, and H. Fotoohi (2001). **Effect of abnormal vaginal discharge at oestrus on conception rate after artificial insemination in cows.** *Animal Science Pencaitland* 72 (3): 535- 538.  
Keywords: cows, heifers, Holstein Friesian, breed, estrus, visual characteristics of the cervical mucous discharge, cervical mucus with urine, cervical mucus with microbes, cervical mucus with blood, no cervical mucus, artificial insemination, conception rate.
- Mele, M., P. Secchiari, A. Serra, G. Ferruzzi, F. Paoletti, and M. Biagioni (2001). **Application of the Atracking signal@ method to the monitoring of udder health and oestrus in dairy cows.** *Livestock Production Science* 72(3): 279-284, ISSN: 0301-6226.  
NAL Call No.: SF1 L5  
Keywords: dairy cows, models, simulations, computational biology, udder health, reproductive system tracking signal method, monitoring method, estrus, milk electrical conductivity, moving average model, mastitis.
- Morales, R.J.S., L Zarco, C.J. Hernandez, and G. Rodriguez (2001). **Effect of short term treatment with bovine somatotropin at estrus on conception rate and luteal function of repeat breeding dairy cows.** *Theriogenology* 55 (9): 1831-1841.  
NAL Call No.: QP251.A1T5  
Keywords: cows, Holstein, breed, estrus on progesterone concentrations, conception rate, repeat breeding, artificial insemination, recombinant bovine somatotropin, luteal function, blood samples.
- Moran, J. and D. McLean (2001). **Heifer Rearing: A Guide to Rearing Dairy Replacement Heifers in Australia** Bolwarrah Press: Bolwarrah, Vic., 135 p.

NAL Call No: SF208 H44

Keywords: calving weights, liveweights, growth, first calving, natural mating, artificial insemination, nutrition, grazing management, disease prevention, herd health, economics, dairy beef, replacement heifers, best management practices

Moreira, F., C. Orlandi, C.A. Risco, R. Mattos, F. Lopes, and W.W. Thatcher (2001). **Effects of presynchronization and bovine somatotropin on pregnancy rates to a timed artificial insemination protocol in lactating dairy cows.** *Journal of Dairy Science* 84 (7): 1646-1659, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: cows, lactating Holstein, breed, presynchronization, bovine somatotropin (bST), pregnancy rates, artificial insemination, GnRH, PGF2alpha, increase first service pregnancy.

Mosure, W.L., R.A. Meyer, J. Gudmundson, and A.D. Barth (1998). **Evaluation of possible methods to reduce pain associated with electroejaculation in bulls.** *Canadian Veterinary Journal* 39(8): 504-506, ISSN: 0008-5286.

NAL Call No.: 41.8 R3224

Keywords: bulls, evaluation, pain, heart rate, electroejaculation, animal welfare, anaesthesia, lidocaine, xylazine, heart rate, semen collection.

Norup, L.R., P.W. Hansen, K.L. Ingvarsten, and N.C. Friggens (2001). **An attempt to detect oestrus from changes in Fourier transform infrared spectra of milk from dairy heifers.** *Animal Reproduction Science* 65(1/2): 43-50.

NAL Call No.: QP251 A5

Keywords: dairy cows, heifers, milk, estrus, infrared spectroscopy, estrous cycle, lactation, prostaglandins, synchronized females, diagnosis.

Pryce J.E., M.P. Coffey, and G. Simm(2001). **The relationship between body condition score and reproductive performance.** *Journal of Dairy Science* 84(6):1508-15, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, body condition score, ad libitum diets, high concentrates, low concentrates, genetic differences, production.

Rensis, F. de, and R.J. Scaramuzzi (2001). **The heat stress and seasonal effects on reproduction in dairy cow.** *Annali della Facolta di Medicina Veterinaria, Universita di Parma* 20: 92, ISSN: 0393-4802.

Keywords: female fertility, Graafian follicles, heat stress, hypothalamus, infertility, ovaries, pituitary, pregnancy, reviews, summer, Italy.

Ronchi, B., G. Stradaoli, A.V. Supplizi, U. Bernabucci, N. Lacetera, P.A. Accorsi, A. Nardone, and E. Seren (2001). **Influence of heat stress or feed restriction on plasma progesterone, oestradiol-17beta, LH, FSH, prolactin and cortisol in holstein heifers.** *Livestock Production Science* 68 (2/3): 231-242, ISSN: 0301-6226.

NAL Call No.: SF1.L5

Keywords: heifers, dairy cows, heat stress, food restriction, blood chemistry, progesterone, estradiol, LH, FSH, prolactin, hydrocortisone, hormone secretion, feed rations, air temperature.

Rutledge, J.J. (2001). **Use of embryo transfer and IVF to bypass effects of heat stress.** *Theriogenology* 55 (1): 105-111, ISSN:0093-691X.

NAL Call No.: QP251.A1T5

Keywords: dairy cows, embryo culture, pregnancy rate.

Smeaton D.C., and H.W. Vivanco (2001). **Potential benefits from new reproductive technologies in commercial dairy herds, a case study simulation.** *Proceedings of the New Zealand Society of Animal Production* 61: 199-202, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: bull, calf, dairy cow, embryo, female, heifer, immature, male, computer software, embryo

transfer, assisted reproduction method, milking, collection method, new reproductive technologies, potential benefits, reproductive method, simulation model, mathematical model method, status quo selection system, breeding method, breeding worth, genetic gain, production cull, control method, selection pressure, New Zealand.

Stevenson, J.S. (2001). **Reproductive management of dairy cows in high milk-producing herds.** *Journal of Dairy Science* 84 (Elect. Supplement): E128-E143, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cows, breeding, husbandry, reproduction, reproductive efficiency, body condition, dry matter intake, transition from the dry period to lactation, estrous cycles, detection of estrus, embryonic survival, diet formulation, feed bunk management, cow comfort, free stalls, holding pens, milking parlor, temperature, humidity, proper hoof care, milking management, mastitis prevention.

Tolleson, D.R., R.D. Randel, J.W. Stuth, S.T. Willard, and B.S. Gandy (2001). **Detection of pregnancy in cattle using near infrared reflectance spectroscopy of feces.** *Journal of Animal Science* 79 (Supplement 2): 19, ISSN: 0021-8812.

NAL Call No.: 49 J82

Keywords: dairy cows, feces, digestive system, near IR reflectance spectroscopy, assessment method, determination method, pregnancy, reproductive status.

van Eerdenburg F.J.C.M. and H. Verhoeven (2001). **The influence of environmental stress around puberty on fertility in dairy cattle: Possible relations with sexual differentiation?** *Hormones and Behavior* 39 (4): 353, ISSN: 0018-506X.

NAL Call No.: QP801 H7H64

Keywords: behavior, behavioral neuroendocrinology, environmental stress, fertility, puberty, sexual behavior, sexual differentiation.

Velasco-Garcia, M.N. and T. Mottram (2001). **Biosensors in the livestock industry: An automated ovulation prediction system for dairy cows.** *Trends in Biotechnology* 19(11): 433-434, ISSN: 0167-7799.

NAL Call No.: TA166 T72

Keywords: ovulation prediction system, automated, progesterone biosensor, pregnancy detection.

Verkerk, G.A., R.W. Claycomb, V.K. Taufa, P. Copeman, A. Napper, and E. Kolver (2001). **CowTrakker™ technology for improved heat detection.** *Proceedings of the New Zealand Society of Animal Production* 61:172-175, ISSN: 0370-2731.

NAL Call No.: 49.9 N483

Keywords: breed, Holstein Friesian, progesterone, field equipment, Bovine Beacon, CowTrakker, motion detector, HeatWatch, pedometer; Kamar Heat Detector, artificial insemination, behavioral observation, pasture grazing, proactive reproductive management, tail paint, identification, New Zealand.

Wagner, D.C., R.H. BonDurant, and W.M. Sischo (2001). **Reproductive effects of estradiol cypionate in postparturient dairy cows.** *Journal of the American Veterinary Medical Association* 219 (2): 220-223, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: cows, postparturient, estradiol cypionate, reproductive efficiency, pregnancy rate.

Wainstein, A.G., A.S. Bernal, M.R. Iriondo, A.O. Luco (2001). **Heatwatch, electronic heat detection system used in Holstein Friesian. [Heatwatch, sistema electrónico de detección de celo evaluado en hembras Holstein Friesian.]** *Archivos de Zootecnia* 50(191): 403-406, ISSN: 0004-0592.

NAL Call No.: 49 AR22

Keywords: cows, heifers, Holstein Friesian, breed, electronic heat detection system, traditional heat detection methods, farm equipment, field conditions.

Walker, W.L., R.L. Nebel, and M.L. Mcgilliard (1996). **Time of ovulation relative to mounting activity in dairy cattle.** *Journal of Dairy Science* 79(9): 1555-1561, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: ovulation, mounting, time activity, Holstein-Friesian, estrus, duration, mating behavior, synchronized females, artificial insemination, timing, telemetry, environmental temperature.

Xu, Z.Z., D.J. McKnight, R. Vishwanath, C.J. Pitt, and L.J. Burton (1998). **Estrus detection using radiotelemetry or visual observation and tail painting for dairy cows on pasture.** *Journal of Dairy Science* 81(1): 2890-2896, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: estrus detection, radiotelemetry, visual observation, remote recording, grazing, sexual behavior, calving season, Jersey, Friesian, remote sensing, milk composition, progesterone, conception rate, mounting, New Zealand.

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## Slaughter

Burchardt, S. (1999). **Stunning and slaughter of animals. [Bedovelse og aflivning af slagtedyr.]** *Dansk Veterinaertidsskrift* 82(21): 928-932, ISSN: 0106-6854.

NAL Call No.: 41.9 D23

Keywords: slaughter, slaughtering equipment, animal welfare, stunning, meat animals, poultry, cattle, sheep, goats, pigs, European Union, Denmark, Danish language.

Canadian Federation of Humane Societies (1990). **Recommended Code of Practice for the Care and Handling of Dairy Cattle** Available from Communications Branch, Agriculture Canada: Ottawa, Ontario, 41 p.

NAL Call No.: 7 C16Pu no.1853/E

Keywords: care, handling, slaughter, transport.

Available online [govt.nz](http://govt.nz)

<http://www.nfacc.ca/codes-of-practice/dairy-cattle>

Dousek, J., V. Vecerek, A. Kozak, and O. Valcl (1999). **Veterinary inspection at slaughterhouses and protection of animals against cruelty. [Veterinarni dozor nad porazenim zvirat z hlediska ochrany zvirat.]** *Veterinarstvi* 49(11): 474-477, ISSN: 0506-8231.

NAL Call No.: 41.8 V6439

Keywords: animal welfare, abattoirs, legislation, Czech Republic, Czech language.

Grandin, T. (2001). **Welfare of cattle during slaughter and the prevention of nonambulatory (downer) cattle.** *Journal of the American Veterinary Medical Association* 219(10): 1377-1382, ISSN: 0003-1488.

NAL Call No.: 41.8 Am3

Keywords: dairy cattle, downers, ambulation, animal handling, welfare, behavior, slaughter, stress, stunning, vocalization

Holleben, K. von, and M. von Wenzlawowicz (1999) **Humane killing of animals on the farm. [Tierschutzgerechtes Töten von Tieren in landwirtschaftlichen Betrieben.]** *DTW: Deutsche Tierärztliche Wochenschrift* 106(4): 163-165, ISSN: 0341-6593.

NAL Call No.: 41.8 D482

Keywords: slaughter, husbandry, destruction of animals, poultry, animal welfare, cattle, pigs, sheep, goats, fowls, German language.

Lowe, A.G. (1999). **Casualty slaughter: a whole new industry.** *Cattle Practice* 7(4): 389-394, ISSN: 0969-1251.

NAL Call No.: SF961 C37

Keywords: slaughter, emergencies, animal welfare, euthanasia.

Schultz, C.E. (1999). **Detection of antibiotic residues in cull dairy cows at slaughter.** In: *Proceedings One Hundred and Third Annual Meeting of the United States Animal Health Association, San Diego, California, USA, October 7-14, 1999*, p. 277-293, United States Animal Health Association: Richmond, USA.

NAL Call No.: SF601.U83

Keywords: antibiotics, cows, dairy cows, drug residues, antibiotic residues, meat inspection, meat hygiene.

Tennessen, T. and J. Murrigan (1999). **Welfare of cull Holstein cows at an abattoir.** *Canadian Journal of Animal Science* 79(4): 586, ISSN: 0008-3984.

NAL Call No.: 41.8 C163

Keywords: cattle, breed-Holstein, cull dairy cow, female, abattoir, animal welfare, avoidance behavior, balking, electric prod, escape behavior, ethology, humane handling.

Tuckey, J.B. (1999). **Slaughter of infant [letter].** *Veterinary Record: Journal of the British Veterinary Association* 145(12): 352, ISSN: 0042-4900.

NAL Call No.: 41.8 V641

Keywords: animal welfare, newborn, attitude of health personnel, cattle.

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## Transport

Bergeron, R., and N. Lewis (1999). **Farm animal transportation, health and welfare. [Transport, sante et bien-etre des animaux de ferme.]** *Cahiers Agricultures* 8(6): 437-444, ISSN: 1166-7699.

NAL Call No.: S5 C34

Keywords: animal welfare, health, transport, livestock, French language.

Eicher, S.D. (2001). **Transportation of cattle in the dairy industry: current research and future directions.** *Journal of Dairy Science* 84 (Elect. Supplement): E19-E23, ISSN: 0022-0302.

NAL Call No.: 44.8 J822

Keywords: dairy cattle, calves, heifers animal welfare, transport, stress, stress factors, stress response, increased heart rate, cortisol concentrations, enzymatic changes, immunological effects, transport of animals, footing, driver, driving conditions, stocking density, postsecondary mortality.

Ferrari, A. (1999). **Stress and the welfare of transported cattle. [Stress e benessere nel trasporto dei bovini.]** *Obiettivi e Documenti Veterinari* 20(6): 43-46, ISSN: 0392-1913.

Keywords: road transport, animal welfare, stress, losses, Italian language.

Fisher, A. D., P.V. Pearce, and L.R. Matthews (1999). **The effects of long haul transport on pregnant, non-lactating dairy cows.** *New Zealand Veterinary Journal* 47(5): 161-166, ISSN: 0048-0169.

NAL Call No.: 41.8 N483

Keywords: dairy cows, breed, Jersey, pregnancy, long-haul transport, creatine kinase, supplementary feeding, body weight, transport of animals, rest, blood serum, blood chemistry, magnesium, mineral supplements, feed supplements.

Kolacz, R.(1999). **European regulations affecting welfare of animals during transport. [Europejskie regulacje prawne dotyczace dobrostanu zwierzat gospodarskich podczas transportu.]** *Zycie Weterynaryjne* 74(10): 491-497, ISSN: 0137-6810.

NAL Call No.: SF604 Z9

Keywords: cattle, sheep, pigs, horses, body weight, feeding, rest, transport of animals, animal welfare, Poland, Polish language.

- Kreuzer, M., W. Langhans, F. Sutter, R.E. Christen, H. Leuenberger, and P.L. Kunz (1998). **Metabolic response of early-lactating cows exposed to transport and high altitude grazing conditions.** *Animal Science: An International Journal of Fundamental and Applied Research* 67(2): 237-248, ISSN: 1357-7298.  
NAL Call No.: SF1.A56  
Keywords: dairy cows, high altitude, transport of animals, adaptation, blood plasma, hydrocortisone, triiodothyronine, thyroxine, insulin, blood sugar, blood lipids, 3-hydroxybutyric acid, lactic acid, urea, mountain grasslands, grazing, heat production, environmental temperature, duration.
- Pearce, P. (1998). **Effects of long distance travel on dairy cows.** *Surveillance (Wellington)* 25(3): 8-9, ISSN: 0112-4927.  
NAL Call No.: SF604.63 N45S87  
Keywords: animal welfare, cows, dairy cows, transport of animals, health, New Zealand.
- Steinhardt, M., and H.H. Thielscher (2001). **Transport stress in dairy calves. Effects of rearing conditions on acid-base balance, haematological variables, blood gas content and heart rate. [Transportbelastung bei Milchrindkalbern. Effekte von Aufzuchtbedingungen auf Saure-Basen-Status, hamatologische Variablen, Blutgasgehalte und Herzfrequenz.]** *Tierärztliche Praxis Ausgabe G, Grosstiere/Nutztiere* 29 (1): 8-16, ISSN: 1434-1220.  
NAL Call No.: SF603.V43  
Keywords: calves, housing, single box, blood sampling, blood chemistry, hematology, stress, transport of animals, German language.
- Steinhardt, M., and H.H. Thielscher (2000). **Response of dairy calves to transport stress at 60 days of age. Effects of rearing conditions and development on selected physiological variables. [Reaktionen von Milchrindkalbern im Alter von 60 Lebenstagen auf Transport mit Strassenfahrzeugen: Effekte durch Haltungsverhalten und Entwicklungsqualität der Kalber auf physiologische Variablen und deren Änderungen.]** *DTW: Deutsche Tierärztliche Wochenschrift* 107(2): 59-65, ISSN: 0341-6593.  
NAL Call No.: 41.8 D482  
Keywords: stress, albumins, blood sampling, creatinine, heart rate, urea, blood chemistry, transport of animals, young animals, calves, German language.
- Steinhardt, M., and H.H. Thielscher (2000). **Transport stress in dairy calves. Effects of rearing conditions on metabolic and hormonal variables. [Transportbelastung bei Milchrindern: Effekte von Aufzuchtbedingungen auf metabolische und hormonelle Variablen.]** *Tierärztliche Umschau* 55(1): 22-28, ISSN: 0049-3864.  
NAL Call No.: 41.8 T445  
Keywords: stress, physiological parameters, albumins, body temperature, body weight, creatinine, hormones, road transport, saliva cortisol, thyroid gland, thyroid hormones, urea, calves, transport of animals, blood chemistry, Germany, German language.
- Steinhardt, M., and H. Thielscher (1999). **Maturity of suckler calves and dairy calves at 2- and 3-weeks-of-age and reactions to road transport. [Entwicklungsqualität von Saugkalbern aus der Mutterkuhhaltung und von Trankkalbern in der zweiten und dritten Lebenswoche sowie Reaktionen der Tiere auf den Transport mit Strassenfahrzeugen.]** *Landbauforschung Volkenrode* 49(2): 70-89, ISSN: 0458-6859.  
NAL Call No.: 18 L2353  
Keywords: calves, transport stress, epinephrine, albumins, venous blood sampling, body temperature, cortisol, norepinephrine, heart rate, haemoglobin, hormones, metabolites, minerals, norepinephrine, thyroid hormones, triiodothyronine, thyroxine, dairy cattle, suckler herds, blood chemistry, German language.
- Steinhardt, M., and H.H. Thielscher (1999). **Observations on acid-base balance, metabolic, hormonal variables and heart rate in dairy calves from the end of automatic milk feeding to transport by road. [Reaktionen von am Trankeautomaten aufgezogenen Milchrindkalbern am Ende der Milchernaehrungsperiode auf Transportbelastung Saure-Basen-Status, metabolische und**

**hormonelle Variablen und Herzschlagfrequenz.] *Tierarztliche Umschau* 54(11): 610-617, ISSN: 0049-3864.**

NAL Call No.: 41.8 T445

Keywords: calves, heart rate, milk production, transport of animals, albumins, body temperature, hydrocortisone, saliva cortisol, stress, urea, thyroxine, triiodothyronine, proteins, blood sampling, blood sugar, lactic acid, blood chemistry, acid base equilibrium, German language.

Steinhardt, M., and H.H. Thielscher (1999). **Response of animals to familiar and unfamiliar situations. Transport and temporary separation of suckled calves from the herd at different ages during rearing. Effect of playing recordings of maternal vocalization on hormones, heart rate and vocal responses. [Reaktionsmuster von Tieren auf gewohnte und ungewohnte Ereignisse. Transport und temporäre Separation von Saugkalbern aus der Mutterkuhhaltung in verschiedenen Altersperioden während der frühen Aufzuchtperiode sowie Effekte der Präsentation von Muttertierufen auf hormonelle Variablen, Herzfrequenz und Lautausserungen der Tiere.] *Landbauforschung Volkenrode* 49(3): 153-166, ISSN: 0458-6859.**

NAL Call No.: 18 L2353

Keywords: cows, dams, heart, heart rate, young animals, vocalization, animal welfare, calves, body temperature, hydrocortisone, stress, German language.

Steinhardt, M., and H.H. Thielscher (1998). **Effects of age and type of husbandry on the the response of dairy calves and suckled calves to transport by road.[Reaktionen junger Milchrindkalber und junger Saugkalber der Mutterkuhhaltung auf Transport mit Strassenfahrzeugen, Effekte durch Alter und Haltungsbedingungen.] *DTW: Deutsche Tierarztliche Wochenschrift* 105(1): 17-24, ISSN: 0341-6593.**

NAL Call No.: 41.8 D482

Keywords: calves, road transport, stress response, heart rate, rectal temperature, age differences, bucket-fed versus suckled calves, German language.

Wilson, L.L., J.L. Smith, D.L. Smith, D.L. Swanson, T.R. Drake, D.R. Wolfgang, and E.F. Wheeler (April 2000). **Characteristics of veal calves upon arrival, at 28 and 84 days, and at end of the production cycle. *Journal of Dairy Science* 83(4): 843-854, ISSN: 0022-0302.**

NAL Call No.: 44.8 J822

Abstract: Holstein bull calves arriving at five special-fed veal farms (eight production groups) were scored for various physical condition traits and blood-sampled within 2 h after arrival and at 28 d, 84 d, and 1 wk prior to slaughter at 116 to 143 d. Of 1179 total calves in the production groups, 758 calves were scored and evaluated. Blood cell analyses (red and white blood cell counts, hemoglobin, and packed cell volume) were conducted at all four sampling times, total serum protein concentration was obtained at 0 and 28 d. The study was initiated in autumn and ended the following autumn. Mean initial and final body weights were 46.3 +/- 0.17 and 209.7 +/- 0.77 kg, mean mortality was 2.5%. Average daily gain of the eight groups ranged from 1.23 to 1.70 kg/d. Subjective scores of 5 = excellent to 1 = very poor condition were used to evaluate 16 different physical condition characteristics. With the exception of leg joint, hoof, and foot scores, most of the physical condition scores exhibited improvement during the first 28 d. Foot and leg impairments did not appear to hinder the ambulatory ability of the calves during the production period. Physical condition scores at d 0 and 28 were generally not related to numbers or types of medical treatments (enteric, respiratory, other, or total) or to average daily gain during the production period. Means for most erythrocytic and leukocytic traits upon arrival (d 0) were within normal ranges, although 27.4% of the calves were clinically or marginally anemic. Final mean hemoglobin and packed cell volume were 8.53 g/dl and 26.1%. Forty-three percent of the calves at d 0 were colostrum deficient, assuming that total serum protein concentrations of <5.5 g/dl indicate colostrum deficiency. No blood trait was consistently correlated with body weight gain when gain during the production period was divided into quartiles and the blood traits were averaged by gain quartile. Calves in the lowest serum total protein quartile (mean 4.58 g/dl) had more respiratory and total medical treatments than quartiles with higher total protein means. Dairy bull calves arriving at veal production units after transporting from the dairy farm to the auction market (or other collection facility) have

several physical impairments. However, most of these physical impairments are improved early in the veal feeding period and are not generally related to subsequent growth rate or medical treatment.  
Keywords: veal calves, Holstein-Friesian, breed, milk substitutes, body weight, liveweight gain, body condition, animal health, mortality, respiratory diseases, hair, hooves, dehydration (physiological), joint diseases, erythrocyte count, leukocyte count, hemoglobin value, hematocrit, blood protein, anemia, medical treatment, colostrum immunity, IGG.

Wilson, L.L., P.A. Nordstrom, M.J. Richards, D.L. Smith, and K.J. Vandergrift (March 1999). **Dairy and veal producer assessment of changes in care, handling, and transportation factors.** *The Professional Animal Scientist* 15(1): 24-33, ISSN: 1080-7446.

NAL Call No.: SF51.P76

Keywords: dairy cows, veal calves, calf production, milk production, cattle husbandry, artificial rearing, livestock numbers, transport of animals, stress management, loss prevention, health, animal welfare, ventilation.

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## Websites

Website addresses change periodically. The sites listed are current as of **January 2003**.

### **Agriculture and Agri-food Canada**

[http://www.agr.ca/index\\_e.phtml](http://www.agr.ca/index_e.phtml)

Agriculture and Agri-Food Canada provides information, research and technology, and policies and programs to achieve security of the food system, health of the environment and innovation for growth. Abstracts available from "The Lennoxville Symposium on Farm Animal Welfare In Canada: New technologies, research and world trade."

### **Alberta Farm Animal Care (AFAC) Association**

<http://afac.ab.ca>

Cambrian PO Box 75028

Calgary, Alberta, Canada

T2K 6J8

Tel: (403) 932-8050, Fax: (403) 932-8052, Email: [info@afac.ab.ca](mailto:info@afac.ab.ca)

AFAC is an association started by farmers. AFAC's goal is to promote responsible animal care and enhance public understanding of Alberta's animal agriculture. AFAC participates in issues and legislation that affect animal care and encourages research relevant to animal care. Website contains *Farm Animal Welfare News* a publication that contains current information on farm animal welfare initiatives, relevant issues, and research conducted in Canada. Reports, codes of practice, legislative information, and information on training courses in dairy handling and transport are also listed.

### **American Dairy Science Association**

<http://www.adsa.org>

1111 N. Dunlap Avenue

Savoy, IL 61874

Tel: (217) 356-3182, Fax: (217) 398-4119. E-mail: [adsa@assoqhq.org](mailto:adsa@assoqhq.org)

The objectives of American Dairy Science Association (ADSA) are to stimulate the discovery, application, and dissemination of knowledge. Original research, reviews and timely information are

published in the official ADSA publication, the Journal of Dairy Science. Special topic publications available for purchase covering dairy health, housing, and management. The ADSA website includes additional links to university dairy related websites, breed associations, and databases.

### **Animal Health and Welfare**

<http://www.defra.gov.uk/animalh/animindx.htm>

The health and welfare of animals is central to Department for Environment, Food & Rural Affairs (DEFRA) work of protecting and improving livestock and controlling and eradicating disease. The Animal Health and Welfare pages are divided into various subject areas including: BSE, Tuberculosis, Identification, Animal Welfare, International Trade, Disease surveillance and control.

### **Animal Welfare Information Center (AWIC)**

<https://www.nal.usda.gov/awic>

National Agricultural Library

10301 Baltimore Blvd.

Beltsville, MD 20705

Tel: (301) 504-6212, Fax: (301) 504-7125, Contact us: <http://awic.nal.usda.gov/contact-us>

The Animal Welfare Information Center (AWIC) located at the U.S. Department of Agriculture's National Agricultural Library provides reference services primarily for patrons using animals covered by the Animal Welfare Act. Farm animals used in teaching, testing, and non-production oriented research are covered by the Act. AWIC produces bibliographies on the welfare and husbandry of swine, cattle, horses, sheep, poultry, dogs, cats, rabbits, and rodents. The Animal Welfare Information Center Bulletin contains several articles on agricultural animal care and use including anesthesia, analgesia, animal transport, and animal welfare issues. The AWIC website includes these documents. The site also contains links to US farm animal policies, guidelines, and congressional activity.

### **Animal Welfare Ministry of Agriculture and Forestry (MAF) New Zealand**

<http://www.biosecurity.govt.nz/regs/animal-welfare>

Full text Codes of Recommendations and Minimum Standards available for dairy cattle and bobby calves. Humane treatment of cattle during transport, slaughter, and sale yards covered.

### **Animal Well-Being and Stress Control Systems**

<http://www.nps.ars.usda.gov/programs/programs.htm?NPNUMBER=105>

The Agricultural Research Service (ARS) is the principal research agency of the U.S. Department of Agriculture. ARS is charged with extending the nation's scientific knowledge across a broad range of program areas. This website describes ARS research initiatives in the area of farm animal well-being and stress.

### **Annotated Database on Refinement of Housing and Handling Conditions and Environmental Enrichment for Laboratory Animals. Part II: Cattle, Calves, Chickens, Goats, Horses, Quails, Pigs, Sheep**

[http://www.awionline.org/Lab\\_animals/biblio/refine.htm](http://www.awionline.org/Lab_animals/biblio/refine.htm)

Database of articles, abstracts, book chapters, and books on all aspects of refinement and environmental enrichment of housing and handling conditions. Regularly updated.

### **Canadian Dairy Information Database©**

[http://cgilnt.aps.uoguelph.ca/cgi-bin/foliocgi.exe/dairy.nfo/query=\\*/doc/{t9}?](http://cgilnt.aps.uoguelph.ca/cgi-bin/foliocgi.exe/dairy.nfo/query=*/doc/{t9}?)

Provides fact sheets, research reports, codes of practice, and other materials regarding the care, health, diseases, breeding, environment, feeding, and reproduction of dairy cattle raised in Canada.

### **Colonel K.L. Campbell Centre for the Study of Animal Welfare**

<http://www.aps.uoguelph.ca/~csaw/>

Located at the University of Guelph, the Centre's mission is to promote the welfare of animals through research and education. Research projects focus on: alternatives for the use of animals in teaching; assessing animal well being; enriching the lives of laboratory animals; ethical issues of animal use; animal breeding and genetic engineering; humane husbandry systems alleviating animal suffering; and relationships between animals and people.

### **Cooperative State Research Education & Extension Service (CSREES) Home Page**

<http://www.nifa.usda.gov>

CSREES links the research and education programs of the U.S. Department of Agriculture and works with land-grant institutions in each state, territory and the District of Columbia. The mission of CSREES is in cooperation with partners and customers, to advance a global system of research, extension and higher education in the food and agricultural sciences and related environmental and human sciences to benefit people, communities, and the Nation. A clickable map of extension programs by state is available at <http://www.nifa.usda.gov/Extension/index.html>. Dairy producers are encouraged to use this site to locate extension materials that are specific to their state's climate conditions, breeds of cattle, types of housing, etc.

### **Combined Livestock Issues Database Information**

<http://www.liru.asft.ttu.edu/refman/index.htm>

Reference database compiled for farm animal researchers and educators. Provides references on contemporary issues in animal agriculture.

### **Companion Animals and Livestock**

<http://www.dpi.nsw.gov.au/agriculture/livestock/dairy-cattle>

Information provided by New South Wales Department of Agriculture on dairy cattle breeding and selection, health, nutrition, facilities, handling, and quality assurance.

### **Dr. Temple Grandin's Web Page**

<http://www.grandin.com/>

Full text, abstracts, reviews, and general information based on or related to the work of applied ethologist Temple Grandin. Topics include livestock behavior, design of stockyards and restraining systems, humane and ritual slaughter, stress and meat quality, current research, animal welfare/rights, and books.

### **Encyclopedia of Farm Animal Behavior (EFAB)**

<http://www.liru.asft.ttu.edu/EFAB/default.asp>

Includes audio and video images. This encyclopedia is intended for research and teaching and will provide a standard for what actions compose a given behavior. Provided by the USDA, ARS, Southern Plains Area, Livestock Issues Research Unit, and Multimedia Division.

### **European Commission on Animal Welfare**

[http://europa.eu.int/comm/food/index\\_en.htm](http://europa.eu.int/comm/food/index_en.htm)

The European Commission's activities on animal welfare start with the recognition that animals are sentient beings. The Directorate General for Health and Consumer Protection is responsible for an important part of this work, setting standards for the welfare of animals on the farm, during transport and at slaughter. Links to animal welfare policy objectives, legislative action, ongoing initiatives, and international animal welfare issues.

### **Farm Animal Welfare Council Report on the Welfare of Dairy Cattle**

<http://www.fawc.org.uk/reports/dairycow/dcowrtoc.htm>

Response of the Royal Agricultural Society of England to the Farm Animal Welfare Council Report on Dairy Cattle.

### **Healthy Animals**

<http://www.ars.usda.gov/is/np/ha/>

The Healthy Animals website offers an online compilation of animal health-related research news by the U.S. Department of Agriculture's chief scientific agency, the Agricultural Research Service.

### **The International Veterinary Information Service (IVIS)**

<http://www.ivis.org>

A not-for-profit organization created to provide clinically relevant, up-to-date information to veterinary practitioners, veterinary students, clinicians and researchers worldwide using the Internet and provides free access to original, electronic textbooks, reviews, updates, and other resources on a wide variety of veterinary topics. All publications are original contributions written specifically for the IVIS website and reviewed by the editor(s) of the book. Each book is available on-line and includes links to information about relevant medications and to abstracts of references. Book chapters can be printed on a desktop printer for easy reading. Veterinary related information available for farm, laboratory, companion, and exotic animal species.

**NetVet**

<http://netvet.wustl.edu/vet.htm>

NetVet focuses on veterinary resources with links to veterinary education, listservs, organizations, publications, and images. This award-winning site is an excellent starting point for looking for materials for training personnel in care and use of agricultural animals. A useful feature of NetVet is the Electronic Zoo. Among the Electronic Zoo animal group icons are horses, cows, pigs, small ruminants, and birds. Each icon contains a list of websites related to these species. The cow page for example, <http://netvet.wustl.edu/cows.htm> includes links to professional associations such as the American Dairy Science Association, trade publications including Hoard's Dairyman, university departments of animal or dairy sciences, and information publications including Information Resources for Mastitis.

**Oklahoma State University, Department of Animal Science Web page**

<http://www.ansi.okstate.edu>

Livestock virtual library, breeds of livestock, multimedia CD-ROM on livestock reproduction, dairy publications on feeding, etc.

**Ontario, Canada, Ministry of Agriculture, Food and Rural Affairs, Livestock Web page**

<http://www.omafra.gov.on.ca/english/livestock/index.html>

Web pages are available for dairy, beef, swine, goats, and alternative livestock. Dairy page includes conference listings, facts sheets on dry cows, calves, health management, forages, waste management, and current legislation.

**Texas A&M Dairy Cattle Website**

<http://animalscience.tamu.edu/ansc/index.htm>

Fact sheets available on dairy cattle feeding, heat stress, hoof care, pest control, mastitis, and more. Select dairy cattle from the menu bar.

**Total Dairy Management at the Cornell Animal Science Department**

<http://www.ansci.cornell.edu/dm/index.html>

This program is designed for students, dairy farmers, agribusiness people and others who have a sincere interest in dairy farm management. Objectives are to gain further understanding of the integration and application of dairy farm management principles and programs with respect to progressive dairying and related industries.

**UC Davis Dairy Cattle Programs and Welfare Page**

<http://www.vetmed.ucdavis.edu/vetext/DA-Progs.html>

Fact sheets available on West Nile Virus, Antrax, Foot and Mouth Disease, biosecurity on dairy farms, body scoring of dairy cattle, colostrum intake in calves, and more. "Dairy Care Practices" a 44 page document covering many aspects of health and production available in PDF format.

### **University of Nebraska Cooperative Extension Dairy Page**

<http://animalscience.unl.edu/web/anisci/anscextensiondairycattle>

Fact sheets published by Extension Dairy Specialists, from the Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. Full text articles on breeding, reproduction, herd management, heat stress, feeding, nutrition, and more.

### **Virginia Cooperative Extension Dairy Page**

<http://www.ext.vt.edu/cgi-bin/WebObjects/Docs.woa/wa/getcat?cat=ir-lpd-da>

Dairy experts from the Common Wealth review literature and suggest recommendations for dairy cattle care and husbandry in the state of Virginia. Abstracts available online covering health, management, nutrition, and reproduction of dairy cattle.

### **University of Alberta, Canada, Western Canadian Dairy Seminar Home Page**

<http://www.afns.ualberta.ca>

Seminar designed for participants who want to improve their knowledge and decision-making abilities in dairy production and technology. Site includes keyword searchable proceedings from 1995.

### **USDA APHIS Veterinary Services (VS) Centers for Epidemiology and Animal Health (CEAH) Dairy page**

[http://www.aphis.usda.gov/vs/ceah/cahm/Dairy\\_Cattle/dairy.htm](http://www.aphis.usda.gov/vs/ceah/cahm/Dairy_Cattle/dairy.htm)

Information on biosecurity strategies for dairy farms. *E coli*, *Salmonella* other disease pathogens covered.

### **WWW Library Dairy Cattle Resources Focuses on Specific Problems**

<http://www.ansi.okstate.edu/library/dairy/sp-prob.htm#welfare>

Links provided to websites and online documents covering management, housing, nutrition, health, disease, genetics, reproduction, and welfare.

### **XPLOR, University of Missouri, Cooperative Extension Dairy Publications**

<http://muextension.missouri.edu/xplor/agguides/dairy/index.htm>

Factsheets and abstracts available on dairy feeding, management, mastitis treatment, breeding, housing, and waste management.

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The Animal Welfare Information Center, Contact us: <http://awic.nal.usda.gov/contact-us>

*<https://www.nal.usda.gov/awic/pubs/dairy/dairy2.htm>  
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