Canning quality and Common Bean Preference in Brazil.

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In the early years large seeded beans (LSB) were planted in cool climate and preferred by the Brazilian consumers. Due to limited land for expansion for these LSB in the cool regions, bean production moved to warmer regions and small seeded beans (SSB) dominated the production. SSB have better adaptation to the warm climate and possess higher and more stable yield. Several large seeded beans are still being grown and consumed locally and command a higher price than the small seeded ones. Cv Pérola has been well accepted and dominates the market due to 40% larger seed size by the consumers and has become a commercial standard for SSB. This marked the quality demand by the urban consumers, who wants slightly larger bean size among the commercial available in SSB, thus the appearance is the first step, before cooking time and taste, to make the decision of purchasing the product. More than 80% of Brazilian population live in the cities and bean consumption is diminishing due to long cooking time. The bean industry want to capture the market by offering canned bean, but the commercial cultivars crack and split during the processing giving the impression of second quality bean.

The Grain Quality Laboratory at CNPAF-Embrapa in Goiania tested nine large seeded and two commercial beans (Pérola and BRS Valente) for their quality parameters, e.g.,: broth thickness, fiber and protein contents, cooking time with and without 0.5% NaCl, seed coat percentage, water absorption before and after cooking, cracking percentage, appearance, and broth, using the standard methods utilized by the CNPAF. Darkening coefficient is calculated from measured reflecting light at 9 and 15 days of storage in the dark and exposed to sunlight, to accelerate the darkening process.

The results are shown in two Tables below. Differences exist between LSB and SSB groups and within the group in several parameters e.g., water absorption before and after cooking; cooking time with and without salt addition, soluble solutes, split after cooking. Hectoliter weight is the specific weight of the bean grain and on average both groups have similar density. Diacol Calima has the highest density and the BRS Radiante has the lowest. Seed coat percentages in LSB are lower than SSB. Percentages of water absorption after 16 hours was higher in LSB but variation among the cultivars were also great. WAF 69 and Hooter in LSB group had lower water absorption and also the longest cooking time without NaCl. In general LSB needed longer cooking time than SSB. This may be the reason that in the future LSB will remain in the market for culinary purposes and SSB will dominate the daily bean consumption in Brazil due faster to cook. Cooking time with additive such as NaCl lower the cooking time for all cultivars tested. Soluble solutes in LSB are lower than SSB and consumers like thick broth. Fiber content did not differ either within or between the groups. The protein content is almost the same between the two groups but variation within LSB group is large. The DRK 18, WAF 69, Etna and Hooter had the lowest protein content while SUG 33 had the highest one.

Almost all cultivars except the white seeded turned darker over time, but in some cases the darkening process stabilized after 9 days.

Conclusion:

Small seeded beans will still dominate the market in Brazil but need urgently new bean cultivars that attend the canning criteria. Large seeded bean will be used as culinary commodity and command a higher price. Large seeded bean production will take place for exportation because

of the low cost of production, provided there are suitable cultivars that meet the international market standard.

Table 1. Canning quality parameters for large and small seeded beans.

Identification	100 seed wt (g)	Hectoliter wt (Kg)	Seed Coat (%)	Water Absorption Before Cooking (%)	Water Absorption After Cooking (%)	Seed Darkening Coefficient after harvest*	
						9 days	15 days
						Treated Seed	
SUG-33	72,53	69,8	9,41	108,05	138,82	4,3	6,1
DRK-18	61,31	74,3	7,87	111,26	139,96	4,8	3,3
DIACOL-CALIMA	60,30	78,4	9,31	109,16	132,49	3,0	2,1
ETNA	49,51	76,2	9,18	109,96	135,48	8,5	6,6
HOOTER	49,08	74,0	9,95	99,89	126,71	11,4	4,3
WAF-69 (white)	44,31	71,2	11,29	81,18	113,85	0,0	0,0
BRS-RADIANTE	44,21	69,2	8,43	101,94	129,22	5,7	5,7
JALO EEP	41,19	68,6	9,49	109,86	120,00	2,0	5,9
JALO PRECOCE	36,97	68,0	9,27	105,59	155,09	1,9	3,5
Mean	**51,05**	**72,2**	**9,36**	**104,10**	**132,40**	**4,6**	**4,2**
PÉROLA (carioca)	28,36	71,6	9,78	104,12	125,87	8,1	5,7
VALENTE (black)	23,51	74,3	10,23	94,40	111,55	-	-
Mean	**25,94**	**73,0**	**10,01**	**99,26**	**118,71**	**8,1**	**5,7**

*Darkening coefficient is calculated with the following formula for treated seeds: [(LC - LTd)/LC]*100, where LC is the luminosity value of control seeds; LTd is the luminosity value of treated seeds after 9 or 15 days harvest. Control refers to seeds kept in the dark and treated means that seeds were exposed to sunlight for 9 and 15 days.

Table 2. Canning quality parameters for large and small seeded beans (cont.).

Identification	Cooking Time (min.)		Soluble Solutes (%)	Fiber Content (%)	Split (%)	APEAR	Broth Thickness	Slime	Protein (%)
	w.o. NaCl	w. 0,5% NaCl							
SUG-33	37,0	28,0	6,32	12,82	3,5	Great	thick/dark	-	23,87
DRK-18	21,0	15,5	7,44	11,35	13,0	Good	thick/dark	+	15,55
DIACOL-CALIMA	16,5	16,5	7,64	12,18	6,0	Good	thick/dark	-	20,28
ETNA	36,5	35,5	7,07	10,22	8,0	Great	thick	++	14,70
HOOTER	38,0	33,0	6,25	11,55	2,5	Great	thick	-	15,73
WAF-69 (white)	39,5	37,5	4,98	12,71	4,5	Good	very thin/light	-	15,77
BRS-RADIANTE	19,5	18,0	8,74	12,67	2,0	Great	ralo/turbid	+	20,65
JALO EEP	24,0	19,0	8,91	12,53	4,0	Good	thin/light	+++	19,99
JALO PRECOCE	22,5	17,5	9,67	13,04	0,5	Great	thin/light	+	21,66
Mean	**28,3**	**24,5**	**7,45**	**12,12**	**4,9**				**18,69**
PÉROLA (carioca)	23,5	20,5	10,19	12,33	9,5	Regular	thin/light	+++	17,41
VALENTE (black)	22,5	18,0	10,51	12,37	13,5	Good	thick	+	18,13
Mean	**23,0**	**19,3**	**10,35**	**12,35**	**11,5**				**18,13**