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MILK PRODUCTION, MILK COMPOSITION AND MEAT PRODUCTION FROM BUFFALOES (BUFFALYPSO) IN TRINIDAD, WEST INDIES

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ABSTRACT: Water buffaloes were imported into Trinidad from India at the beginning of the 19th century. Indian indentured labourers used the males to haul sugarcane and the cows to provide milk for the family. During the mid-19th century, selection and crossbreeding among the originally imported breeds began with a view to develop a specialized beef animal – now commonly referred to as **Buffalypso**. It meant ignoring the milk production potential of these animals. However, during the early 1990s it was decided to develop buffaloes in to a dual-purpose animal for milk and meat. To fulfill this objective, the Ministry of Agriculture established a small milking herd of about 15+ cows at its Aripo Livestock Station, which continued to expand in to the latter 1990s. There has been some level of inbreeding as the herd was closed to outside introductions. The management and feeding of the herd was of average level.

Preliminary results indicated average milk yield of 3.09 kg/cow/day (once a day hand milking) with average lactation length of 192 days. Preliminary percent averages for milk composition were: 7.15 ± 2.47 for fat, 4.03 ± 1.24 for protein, 16.97 ± 3.38 for total solids, and 8.84 ± 1.29 for solids not fat. Results from a preliminary trial to determine optimum age/weight at slaughter, dressing percentage and weights of head, skin, feet, liver, digestive tract and blood as a percent of live weight at slaughter were also reported. Hot carcass yield ranged between 46.9 – 52.5% while 7-d chill carcass yield ranged between 41.9-47.6%. It is recommended that buffalo males should be slaughtered at about 400 kg live weight or when at least 20 mo old.

Keywords: buffalo, milk composition, carcass traits.

INTRODUCTION

The water buffaloes are not native to Trinidad and the riverine type milch buffaloes were imported in to Trinidad from India at the beginning of the last century. Indian indentured labourers used the males to haul sugarcane and the cows to provide milk for the family and neighbours. During the mid-19th century, selection and crossbreeding among the originally imported milk breeds started with a view to develop a specialized beef animal – now commonly referred to as **Buffalypso**. Consequently, milk production potential of these animals was ignored. However, since the late 1970s the authors and others have been advocating the use of Trinidad water buffaloes for meat as well as milk production – not only in Trinidad but also throughout the Caribbean (Rastogi, Youssef and Gonzales, 1978; Rastogi, 1987; Williams, 1988; Rastogi et al., 1993). To fulfill this objective, the Ministry of Agriculture established a small milking herd at the Aripo Livestock Station during the early 1990s under the direction of the

senior author. The herd initially comprised of about 15 cows and continued to expand in to the latter 1990s. There was some level of inbreeding as the herd was closed to outside introductions.

This preliminary study reports on milk production and its composition and on carcass traits.

MATERIAL AND METHODS

The herd of milking buffaloes at Aripo Livestock Station in east Trinidad was derived from more or less feral buffaloes kept under minimum management. Young calves were chosen from these to make-up the herd. Cows were allowed to calve on pasture and then brought indoors. Lactating cows spent the nights out but were brought in on mornings, washed and penned in preparation for hand milking. During milking, cows were fed about 1kg of a commercial dairy ration (14% CP) per head. Cows were hand milked once a day and the milk yield recorded. After milking, calves were allowed to suckle for 1-2 hr over a period of 2 weeks post-calving. Calves were then removed to a calf enclosure. The dams were placed in the milking herd and let out to pasture. Cows were exposed to bulls for the first service 45 – 60 days post-calving. The breeding bull stayed on pasture with the milking cows for 3 mo before being replaced by another. Health management and routine health duties were performed by a full time Animal Health Assistant assigned to the project and by the Veterinary Officer attached to the Station. Pregnancy checks were done as part of the Clinical Rotations for Final Year students studying for DVM degree at the School of Veterinary Medicine.

The herd management, particularly feeding, can be categorized as low level. There were shortages of concentrate feed as well as pasture grass, particularly during the dry season. The climate of Trinidad is subtropical with relatively high humidity throughout the year. Buffaloes were somewhat inbred as the herd was closed to outside introductions. Thus, production parameters reported in this study were biased downward.

During the years 1994 – 1996, one hundred composite milk samples (100 ml each) were collected on a once per week basis, that is, milk from all the cows being milked on a given morning was pooled before sampling. Only a subset of observations on milk composition has been summarized in this study. The milk samples were analysed for fat, protein, lactose, solids not fat, total solids, ash content, energy content and calcium, according to procedures outlined by the Association of Official Analytical Chemists (AOAC, 1980) and the Nestle manual of milk analysis.

In another trial, one group of intact buffalo bulls was slaughtered at different ages and, another group slaughtered at different live weights. Actual slaughtering was done at Sugarcane Feeds Centre abattoir when various carcass traits were measured and recorded. Bulls were off feed for 24 hrs before slaughter. The trial period for slaughter-by-age group was between April 1996 to April 1997, and that for slaughter-by-weight group was between May 1997 and May 1998. The slaughter data was subjected to simple one-way ANOVA.

RESULTS AND DISCUSSION

For the seven-year period between 1993-2000, a total of 390 calvings were recorded. The distribution of calvings by month and season of calving is presented in Table 1. 67.7% of the total calvings occurred during the Wet season (June through January). Assuming a gestation period of 10 mo, fully 49.7% of the cows conceived during the peak of the previous dry season, i.e., during March through May so as to calve during the following December through February. Calving in buffaloes is reported to be seasonal and is often attributed to variations in temperature, humidity and assumption of low fertility during the dry season. Perhaps, low humidity and slightly cooler nights during the dry season may be more conducive for conception to occur such that cows could benefit from better forage availability during the wet season.

Table 1. Monthly distribution of calvings in buffaloes at Aripo Livestock Station (Trinidad) for the 1993-2000 period

	Calvings	
Month	**No.**	**%**
February	72	18.5
March	26	6.7
April	9	2.3
May	19	4.9
Dry season (Feb. – May)	**126**	**32.3**
June	25	6.4
July	21	5.4
August	30	7.7
September	10	2.6
October	18	4.6
November	38	9.7
December	56	14.3
January	66	16.9
Wet season (June-Jan.)	**264**	**67.7**
Total	**390**	**100%**

The means for lactation length and milk yield per day and total for the lactation are given in Table 2 for 1995-99 period. The mean lactation length was 191.6 days (range: 28-366 d), which is lower than most values reported in the literature (Montiel-Urdaneta et al., 1997; Terramoccia et al., 1999; Khan et al., 1999). The mean lactation length in this study is comparable with the mean of 220 days reported by Dysli (1988, cf. Williams, 1988) for Trinidad buffaloes, imported into and being milked in Honduras.

Table 2. Means for total lactation milk yield, yield/day and lactation length for buffaloes at Aripo Livestock Station (Trinidad) for 1995-1999 period*

Year	No of lactations	Lact. Length ± SE (days)	Yield/d ± SE (kg)	Lact. Yield ± SE (kg)
1995	14	245.6 ± 19.8	3.23 ± 0.42	767.4 ± 92.2
1996	25	188.6 ± 14.8	3.31 ± 0.31	673.8 ± 69.0
1997	33	161.3 ± 12.9	2.92 ± 0.27	444.2 ± 60.0
1998	36	197.7 ± 12.3	3.09 ± 0.26	631.5 ± 57.5
1999	52	195.3 ± 10.3	3.06 ± 0.22	621.2 ± 47.8
Overall	160	191.6	3.09	611.3

* Cows hand milked once per day and suckled their calves.

The mean total lactation yield, averaged over all lactations, and based on once a day hand milking with calf suckling the mother was 611.3 kg (range: 767.4 – 444.2 kg). The mean milk yield/d/cow was 3.09 kg (range: 0.50 – 15.42 kg, Table 2). These values in our study are comparable to national averages for countries, such as, India and Egypt (National Research Council, 1981). Dysli (1988, cf. Williams, 1988) presented some first time data on Trinidad buffaloes being milked in Honduras. Total milk yield was 830 kg / 220d lactation while cows suckled the calves for 2 hr after completion of milking.

The lactation length and milk yield by lactation sequence are presented in Table 3. Cows in their second lactation had the highest yield (701.1 kg), which declined towards the fourth lactation, as did the lactation length. This may point towards low persistency of lactation.

Table 3. Lactation length and yield by lactation sequence for buffaloes at Aripo Livestock Station (Trinidad) for 1995-1999 period

Lact. Sequence	No. obs.	Lact. Length ± SE (days)	Milk yield ± SE (kg)
1st	35	176.1 ± 10.8	497.4 ± 54.1
2nd	32	199.1 ± 11.3	701.1 ± 56.6
3rd	19	187.5 ± 14.6	555.9 ± 73.4
4th	3	118.3 ± 36.8	357.6 ± 184.9

The chemical composition of milk is presented in Table 4. The mean percentages for fat, protein, lactose, solid not fat, total solids, ash and Ca were 7.15, 4.03, 5.60, 8.84, 16.97, 0.85 and 0.23 respectively. These percentages are comparable to those reported by other researchers working in Argentina, Bulgaria, Italy and Venezuela (Bava, et al., 1997; Faria et al., 1997; Peeva, 1997; Terramoccia et al., 1999; Patino et al., 2003). However, mean energy content in this study (79.21 calories/100g milk) is lower than that reported by Bava et al. (1997).

Table 4. Chemical composition of buffalo milk at Aripo Livestock Station for 1994-1996 period

Constituents	No. obs.	Mean (%)	S.D.
Fat	129	7.15	2.47
Protein	129	4.03	1.24
Lactose	1	5.60	-
Solids not fat	129	8.84	1.29
Total solids	129	16.97	3.38
Ash	34	0.85	0.09
Ca	64	0.23	0.10
Energy (Calories/100g)	19	79.21	-

The means for various carcass traits according to age at slaughter are presented in Table 5 and those according to live weight at slaughter are presented in Table 6. All buffaloes in the carcass study were intact males and those which were slaughtered according to live weight were 20 mo or older in age. Analysis of variance showed significant differences between age groups for percent hot and 7-d chill carcass weight, and for weights of skin, feet, head, penis and tail (Table 6). Differences between weight groups were significant ($P>.05$) for weight of hot and chilled carcass, and for weights of skin, feet, head, penis and tail. All percentages were expressed on the basis of live weight at slaughter, which was measured after 24 hr fasting. Hot carcass yield ranged between 46.9 – 52.2% and 7-d chill carcass yield ranged between 41.9 – 47.6%, representing a loss of 5% due to shrinkage. Overall means for various carcass traits in this study were comparable to those reported from Brazil for Mediterranean and Jafarabadi buffaloes. Carcass yield increased slightly with age at slaughter but not with weight at slaughter once the animals were 20 mo or older in age. It is recommended that buffalo males should be slaughtered at approximately 400 kg live weight or when at least 20 mo old.

In conclusion, the preliminary results presented in this report constitute the baseline data on the herd at the Aripo Livestock Station collected to assess the potential of Trinidad water buffaloes as producers of milk and meat. The performance of the herd is variable and below the real genetic potential of animals which can be improved through improved management, feeding, breeding and health control.

Table 5. Means of buffalo carcass traits according to age groups

Treatment Group	No.	Live Weight	Hot Carcass		7-d Chill Carcass		Skin		Feet		Head		Liver		Penis	Full Digestive Tract		Empty Digestive Tract	Tail
			(kg)	(%)[A]	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(kg)	(%)	(kg)	(kg)
Overall mean	22	233.4	116.1	49.2	105.7	44.7	20.2	8.5	7.1	3.1	16.1	7.0	2.9	1.2	1.9	42.2	18.6	20.4	0.6
Error SD		32.0	20.5	2.1	19.1	2.2	4.7	0.9	0.9	0.2	1.8	0.5	0.5	0.2	0.6	11.5	5.4	2.9	0.1
Age groups (mo)		***	***	**	***	**	***	*	***	***	***	NS	***	NS	***	NS	NS	***	***
14	7	176.4	85.0	48.1	77.8	43.9	13.7	7.7	5.8	3.3	12.2	7.0	2.3	1.3	1.4	35.8	20.7	15.9	0.4
16	5	192.8	90.6	46.9	81.0	41.9	15.7	8.1	6.2	3.2	14.4	7.5	2.4	1.2	1.4	37.1	19.4	17.9	0.5
18	5	286.4	147.1	50.9	134.4	46.5	25.7	8.8	8.3	2.9	19.4	6.8	3.6	1.3	2.9	51.4	17.7	24.5	0.8
20	5	300.6	154.2	51.3	140.7	46.8	28.4	9.4	8.5	2.8	20.0	6.7	3.6	1.2	2.3	47.1	15.6	25.2	0.7

*P<0.05; **P<0.01; ***P<0.001; NS = Not significant (P>0.05)

[A]: all percentages based on live wt.

Table 6. Means of buffalo slaughter traits according to weight groups

Treatment Group	No.	Live Weight	Hot Carcass		7-d Chill Carcass		Skin		Feet		Head		Liver		Penis	Full Digestive Tract		Empty Digestive Tract	Tail
			(kg)	(%)[A]	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(%)	(kg)	(kg)	(%)	(kg)	(kg)
Overall mean	14	401.1	208.9	52.1	189.0	47.1	39.7	9.9	9.8	2.4	25.6	6.4	4.8	1.2	3.9	57.2	14.3	30.8	1.0
Error SD		11.3	10.2	1.8	8.2	1.6	2.6	0.7	0.4	0.1	0.8	0.2	0.9	0.2	0.5	12.9	3.4	5.9	0.1
Weight groups (kg)		***	***	NS	***	NS	***	*	**	NS	***	***	NS	NS	*	NS	NS	NS	*
375	4	368.8	189.6	51.4	175.6	47.6	35.6	9.7	9.4	2.5	24.8	6.7	4.4	1.2	3.3	56.8	15.5	29.6	0.8
400	5	401.8	210.7	52.4	188.0	46.8	38.0	9.5	9.7	2.4	25.0	6.2	5.2	1.3	4.0	55.7	13.9	29.6	1.0
425	5	426.2	222.5	52.2	200.8	47.1	44.6	10.5	10.2	2.4	26.9	6.3	4.8	1.1	4.2	59.1	13.9	32.8	1.1
450[E]	1	450.0	229.0	50.9	202.3	44.9	43.6	9.7	10.0	2.2	27.3	6.1	5.8	1.3	4.8	87.0	19.3	30.0	1.0

*P<0.05; **P<0.01; ***P<0.001; NS = Not significant (P>0.05)

[A]: all percentages based on live wt.

[E]: excluded from ANOVA

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