Genetics and Reproduction

Original

Water Buffaloes I. Performance of the Pure Buffalypso Herd in Cuba

Alina Mitat Valdés *

*Center for Tropical Livestock Breeding (CIMAGT), Loma de Tierra, Cotorro, La Habana, Cuba.

Correspondence: isamani51@gmail.com

Received: January, 2022; Accepted: January, 2022; Published: February 2022.

ABSTRACT

Background: Cuban buffalo herds are made of an indiscriminate mixture of river subspecies represented by breeds Buffalypso and Mediterranean, and the swamp species Carabaos. In thi sstudy, the performance of Buffalypso animals includes the 1983-1992 period, though the related scientific information published is poor. **Aim.** To report on the reproductive, productive and fattening performance of Buffalypso in Cuba. **Methods:** Three databases were included in the study: one comprising reproductive data from 625 female buffaloes, with 2222 births for incorporation age determination (AINC), weight at the beginning of reproduction (WINC), first calving date (FCA), calving interval (CI), and calving seasonality. The second source included the dairy production data of 826 lactating animals from 323 cows, to set the production of milk in 244 (M244), milk in 305 (M305), and total milk (MTOT), duration of lactation (DLAC), fat in 305 days (F305), and total fat (FTOT). The third set of data was made using the weights of 43 males at Los Naranjos company, to know the mean daily gain (MDG), and the initial and final weights. The data were processed using GLM, Freq, and SAS Corr (1995). **Results:** The AINC was 20.8±1.8 months; WINC, 369.2±5.7 kg; EPP, 37 months; and FCA, 401.9±9.4 months, with 65.7% of calving occurring in July-October. The mean milk production was 742.5±19.9 kg in 202.1±8.9 months. The F305 was 5.9%; 6.1%, and 5.8%, whereas FTOT was 5.1%; 6.9%, and 5.1% in the Panamanian, Trinitarian, and Cuban cows, respectively. **Conclusions:** The Buffalypso showed a very satisfactory performance during the first months of breeding, though it was affected by herd growth, reduced feed supply, and low selection index, which should be considered along with the non-genetic factors affecting them in herd management planning.

Keywords: Buffaloes, performance, herd (*Source*: *MeSH)*

INTRODUCTION

Buffalypso is a meat breed selected from the islands of Trinidad and Tobago that resulted from the indiscriminate crossing of five dairy breeds of India: Murrah, Nili-Ravi, Jaffarabadi, Surti,

Citation (APA)
Mitat Valdés, A. (2022). Water Buffaloes I. Performance of the Pure Buffalypso Herd in Cuba *Journal of Animal Production*, *34*(1). https://revistas.reduc.edu.cu/index.php/rpa/article/view/e4092.

and Bhadawari (Bennett *et al*., 2007); however, the ones that originated this breed are high milk producers in their country of origin (Aujla and Hussain, 2015; Rathod *et al*., 2018; Singh, and Saini, 2020; Verma *et al*., 2017).

The first animals (25 females and two studs), arrived in 1983 from Panama. From that year and until 1989, they were imported from Trinidad and Tobago (241 cows and 11 bulls) and were allocated in Los Naranjos Company, in Majana, the south coast of Artemisa, in the west of Cuba. All the animals lacked genealogical and productive controls.

In 1986, having a total of 745 animals, including 82 cows (79 milking), the production of milk reached 93 094 liters, which were sold at the Centro Supermarket in Havana as derivatives, namely, natural yogurt, lemon-flavored yogurt, acidophilus milk, and jellified milk with a coconut flavor. All were highly demanded by consumers.

From 1989 on, Carabaos were purchased from Australia, and a crossing program was started, which went out of control due to the ownership conditions. Accordingly, the results included for the pure Buffalypsos only comprised the 1983-1992 period. Hence, the aim of this study is to report on the reproductive, productive, and fattening performance of Buffalypsos in Cuba.

MATERIALS AND METHODS

A number of three databases were used. One contained the reproductive information of 625 animals born in Cuba to determine age and weight (AINC, AINC), age at first calving of 404 animals (FCA), and the calving interval (CI) from a sample of 2 222 births that took place in that period, which corresponded to the buffaloes imported from Panama and Trinidad and Tobago, and the Cuban calves (151, 1218, and 853 calvings, respectively), of which the data from 2013 deliveries were used to know the monthly distribution. An analysis of variance was performed using the method of linear models (MDG) from SAS (1995), to analyze the effects of year and month of birth on AINC, WINC, and FCA, as well as the effects of origin, year, and calving semester on the CI. SAS Proc Freq was used to know the calving distribution by month.

Another dataset contained the data from 323 cows and 826 lactating animals, between 1983 and 1989, distributed according to their origin: Panama (69), Trinidad and Tobago (579), and the ones born in Cuba (178). The attributes studied were milk production at 244, 305 days, and total production (M244, M305, MTOT), duration of lactation (DLAC), fat at 305 days (F305), and total (FTOT). An analysis of variance was performed using the general linear models (MDG) from SAS (1995), to analyze the effects of origin, year and month of birth on every trait, in addition to the number of lactating animals, for the Cuban-born animals. The calculation of Pearson and Spearman correlations among the reproductive traits was done through the SAS Proc Corr procedure.

The monthly weighing data of 43 non-castrated Buffalypsos were used to know the fattening performance of stabled males. The initial and final weights were determined, along with the mean

daily gain (MDG) during the period. The effects of year and month of birth on these indicators was analyzed according to the procedure of general linear models (GLM) (SAS, 1995).

The animals were located in coastal areas from Los Naranjos Company. Weaning was performed at 8 months, and the staple feed consisted of natural grass, buffalo grass (*Brachiaria mutica*), bahiagrass (*Paspalum notatum*), seashore paspalum (*Paspalum virgatum*), and smut grass (*Sporobolus indicus*), as well as introduced, such as Pangola-grass (*Digitaria decumbens*), and Bermuda grass (*Cynodon dactylon*). During the dry season, it was supplemented with Elephant grass (*Pennisetum purpureum x Pennisetum typhoides*).

The fattening stabled buffaloes consumed Elephant grass (*Pennisetum purpureum* x *Pennisetum typhoides*), mineral salts, and 3% molasses at will, plus 1.1 kg/animal/day/feddstuffs.

The cows were milked once a day, using a calf. Milking was mechanical in the No. 505 dairy; many of the cows had never been milked in their countries of origin.

RESULTS AND DISCUSSION

Reproductive results

The age of incorporation to reproduction was 20.8±1.8 months, with an average weight of 369.2±5,7 kg (Table 1), which can be considered very satisfactory for the species under the breeding conditions of Cuba, and at the beginning of the program.

Table 1. Results of reproductive indicators of the first Buffalypso born in Cuba.

Year of birth	Incorporation to reproduction		Age at first calving
	Age±SE (months)	Weight±SE (kg)	FCA±SE (days)
1983	18.2±1.5^{ac}	383.1±14.9^{ac}	914.6±121.3^{a}
1984	17.9±0.5^{a}	400.3±5.0^{ac}	923.4±45.2^{a}
1985	18.1±0.4^{a}	387.8±4.3^{ac}	1052.8±41.0^{b}
1986	18.1±0.4^{a}	392.6±4.2^{ac}	1063.5±38.9^{b}
1987	19.6±0.3^{ac}	369.4±3.5^{a}	1138.5±35.1^{b}
1988	23.2±0.3^{b}	359.2±3.5^{ab}	1176.2±37.3^{bc}
1989	22.8±0.3^{b}	373.9±3.8^{a}	1227.5±68.1^{c}
1990	24.8±0.5^{b}	352.2±4.9^{b}	1146.0±154.8^{b}

Unequal scripts in the same column differ significantly ($p<0.05$)

The two parameters were highly influenced ($p<0.0001$) by the year and month of birth. It was higher in relation to age and incorporation in the ones born from1988 on, but weight decreased as a result of a higher number of animals in the herd, and a reduction of feed supply. In relation to month of birth, the calves born in January and February had the best ages and weights of incorporation.

The age of first calving was 1118.26±16.1 days (37 months), similar to the one found in Colombia, in crossbred females of Buffalypso x Murrah, which, according to Dumar Ayala and Romero Ortíz (2014), was 36.7 months.

The FCA was significantly influenced by the year of birth of Cuban calves. Table 1 shows an increase of this attribute within the years studied, in keeping with the higher AINC and lower WINC, which caused a rise in period of service.

The average CI was 401.9±9.4 days; the ones that calved in the second semester showed a lower CI (401.8±3.7 days), compared to the ones that calved in the first semester (434.9±5.2 days), with a highly significant difference ($p<0.0001$). In relation to the origin, the Panamanian, Trinitarian, and Cuban buffaloes showed values of 407.0±7.5; 410.4±3.9; and 437.8±4.7, respectively. The last group differed significantly ($p<0.001$ and $p<0.0001$) in the animals imported from the two countries.

The average calving interval was slightly higher than the one observed in Cuba for Buffalypso x Carabao females (Ceró *et al.*, 2017), who reported 382.2 days in the province of Camagüey, Cuba; and the ones from the dairy facility at the animal Science Institute between 2000 and 2006, whose values ranged between 365 and 380 days (Fundora, 2016).

Seasonality was manifested in the calvings that took place between 1983 and 1990, 65.7% occurred between July and October (Figure 1), coinciding with the ones reported in the east of Cuba, where 76% occurred between July and September (Almaguer *et al*., 2015), in Panamá (De León-García *et al*., 2022), and in Venezuela (Nava-Trujillo *et al*., 2019).

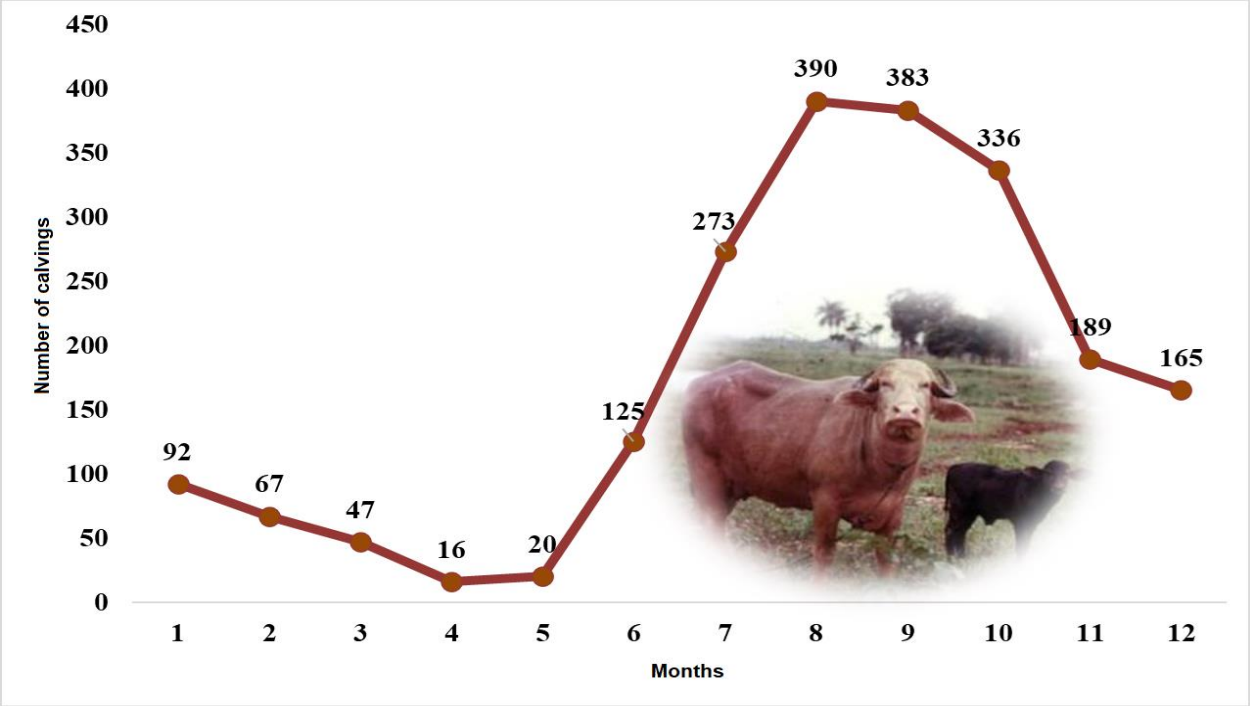

Figure 1. Monthly calving behavior between 1983 and 1990 in Los Naranjos Company

Dairy production results

An analysis of variance (Table 2) showed that the origin (Panama, Trinidad and Tobago, and Cuba), and the number of lactating animals had significant effects on M244 and M305 ($p<0.05$).

Besides, all the attributes studied were significantly affected by the calving year and month ($p<0.001$), coinciding with Dangar and Vataliya (2018), in Jaffarabadi cows.

Table 2. Results of analyses of variance

	Effects of origin, calving year and month, and lactating animals					
	M244	**M305**	**MTOT**	**DLAC**	**F305**	**FTOT**
Origin	NS	*	NS	NS	NS	NS
Year	NS	**	***	***	***	***
Month	NS	NS	**	***	NS	NS
NL	*	*	NS	NS	NS	NS
R2	32.2	67.1	17.3	16.0	89.6	42.9
VC	20.8	21.1	49.2	36.0	7.0	14.6
CME	211.4	260.7	387.1	76.6	0.4	0.9

*** (p<0.05); ** (p<0.001); ***(p<0.001)**

The MTOT and DLAC variation coefficients were high (49.2% and 36.1%), reflecting the existing variability of the herd, which indicates the influence of other uncontrolled factors.

The mean milk production was 742.5±19.9 kg in 202.1±8.9 days of lactation, which is common in animals with a low selection pressure, above the data reported by Rastogi and Rastogi (2005) in the Trinitarian herd that originated the Cuban herd, with 611.3 kg in 191.6 days of lactation.

The milk production recorded from the first cows born in Cuba was 786.6±19.6 kg in 212.2±8.7 days of lactation. The MTOT and M244 attributes associated with the lactating animal number rose toward the second calving, with a drop in the third one (Table 3), whereas L305 underwent the lowest value in the first calving, and a maximum in the third.

The F305 and FTOT percentages were 5.9%, 6.1%, 5.8%, and 5.1%; 6.9%; 5.1%, in the Panamanian, Trinitarian, and Cuban herds, respectively, which were lower than the reports of Rastogi and Rastogi (2005) for this genotype.

Table 3. Productive indicators of Buffalypso cows

Origin	M244±SE (kg)	M305±SE (kg)	MTOT±SE (kg)	DLAC±SE (days)
Panama*	1070.6±68.9	1656.1±251.8	763.4±54.7	196.7±11.1
T. Tobago*	984.3±42.6	1290.4±91.7	725.1±33.7	203.8±6.8
Cuba**	880.1±50.9	1085.4±111.7	723.4±44.7	216.5±9.1
TOTAL	1011.3±14.9	1286.1±17.5	742.5±19.9	202.1±8.9
Milk production according to the number of Buffalypso lactating animals born in Cuba				
NL1	881.8±66.2	1055.8±174.7	751.6±105.1	227.1±20.8
NL2	1057.3±88.3	1337.3±194.7	902.3±117.0	240.6±23.1
NL3	869.1±139.7	1345.1±280.4	724.6±149.2	221.6±29.5

*** The lactating animal number was unknown; ** every lactating animal in Cuba.**

The correlations between the productive and reproductive traits were discreet, and remained below 0.23 units. The highest correlation value (0.80) was found between the total milk and the lactating days.

Table 4. Pearson (above the diagonal), and Spearman (below the diagonal) correlations between the reproductive and productive parameters

	AINC	WINC	FCA	CI	MTOT	DLAC
AINC	1.00	-0.20328	0.28599	0.20771	-0.01568	0.03048
WINC	-0.26625	1.00	-0.16628	-0.08743	0.10962	-0.04022
FCA	0.40229	-0.24478	1.00	0.16269	-0.06937	-0.22963
CI	0.23610	-0.07283	0.11002	1.00	0.03824	0.16395
MTOT	-0.00697	0.12491	-0.10383	0.02092	1.00	0.80403
DLAC	0.05399	-0.03825	-0.27590	0.05158	0.81791	1.00

Results of stable fattening

The mean daily gain of stabled animal fattening was determined after a 130-day long trial, with a mean initial age of 10.3 months, and weights of 253.1±6.5 kg. At the end of the stabling period, 14.6 months on average, the weight was 385.5±7.8 kg, and the mean daily gain was 1.09±0.6 kg/day (Table 5).

Table 5. Results of stabled Buffalypso male fattening

Year of birth	Initial age (months)	Initial weight (kg)	Final age (months)	Final weight (kg)	MDG (kg/day)
1983	20.3	412.0±30.1	24.6	546.8±42.8	1.03±0.2
1984	9.3	255.6±9.8	13.6	388.5±13.8	1.02±0.1
TOTAL	10.3	253.1±6.5	14.6	385.5±7.8	1.09±0.6

The group of animals incorporated at the age of 9 months showed the same gain (1.02 kg/day) as the ones born a month before, and weighed 388.5±13.8 kg at 13.6 months old. These results were highly satisfactory for the species under stabled fattening conditions, and indicated that in a short period (4 months), the Buffalypso are ready for slaughtering at early ages (13 months), with appropriate weights for quality and sufficient quantity for the human diet.

CONCLUSIONS

Based on these results, and considering the environmental conditions, herd characteristics, and the existing knowledge on this species, it can be concluded that Buffalypsos in every ecosystem of the Cuban context are a valid option to produce food with a high nutritional value for human consumption. Nevertheless, productivity can be increased provided that improvements are introduced in managing systems, feeding, selection, health, and technical training, which will also permit greater accuracy of the productive potential and the causes that affect it.

Moreover, to succeed in developing this species, it is essential to foresee herd growth, based on the high natality and low mortality of buffaloes, to prevent the deterioration of reproductive and productive parameters, increase the selection indexes, and organize breeding animals for meat production.

REFERENCES

Almaguer, Y., Font, P. H., Quirino, R. C., Montes, I., Rosell, R., Barzaga, R., & Da Silva, S. (2015). Estacionalidad de los partos en hembras bubalinas (buffalipso) de la Empresa Agropecuaria Bayamo en Granma. *REDVET. Revista Electrónica de Veterinaria*, *16*(7), 1-7. https://www.redalyc.org/pdf/636/63641400007.pdf

Aujla, K., & Hussain, A. (2015). Economics of milk production of major dairy buffalo breeds by agro-ecological zones in Pakistan. *Pakistan Journal of Agricultural Research*, 28(2), 179-191. https://inis.iaea.org/search/search.aspx?orig_q=RN:46129501

Bennett, S. P., Garcia, G. W., & Lampkin, P. (2007). The buffalypso: the water buffalo of Trinidad and Tobago. *Italian Journal of Animal Science*, *6*(2), 179-183. https://www.tandfonline.com/doi/abs/10.4081/ijas.2007.s2.179

Ceró, A., Guevara, G., del Toro, A., Tamayo, Y., Alvarado, H., & Hurtado, W. (2017). Rasgos de crecimiento y reproductivos en hembras bufalinas (Bubalis bubalus) en Camagüey, Cuba. *Revista Electrónica Veterinaria*, *18*(10). http://www,veterinaria,org/revistas/redvet/n101017,html

Dangar, N., & Vataliya, P. (2018). Environmental factors affecting lactation milk yield of Jaffarabadi buffaloes in an organized farm of Gujarat. *Buffalo Bulletin*, *37*(4), 473-480. https://kuojs,lib,ku,ac,th/index,php/BufBu/article/view/486

De León-García, R. H., Abrego, S., Espinoza, A., Vega, N., & González, V. 2022. Estacionalidad de los partos en búfalos (Bufalypso)en el trópico bajo panameño. *Ciencia Agropecuaria 34*:91-104. http://www.revistacienciaagropecuaria.ac.pa/index.php/ciencia-agropecuaria/article/view/587

Dumar Ayala, J. K., & Romero Ortiz, J. D. (2014). Evaluación de parámetros productivos y reproductivos en la bufalera El Marañón en la Dorada en el departamento de Caldas. https://ciencia.lasalle.edu.co/zootecnia/213/

Fundora, O. (2016). Performance of river buffaloes (Bubalus bubalis) from Buffalypso breed in feeding systems based on grazing: fifteen years of researches in the Instituto de Ciencia Animal. *Cuban Journal of Agricultural Science*, *49*(2). https://scholar.google.es/scholar?cluster=15642116615567540502&hl=es&as_sdt=0,5

Nava-Trujillo, H., Valeris-Chacin, R., Hernandez, J., Nuñez, M. D., Morgado-Osorio, A., Caamaño, J., & Quintero-Moreno, A. (2019). Effect of season and parity on water buffalo calving distribution throughout the year in Venezuela. *Rev. Acad. Ciênc. Anim*, *17*(e17013), 2596-2868. DOI:10.7213/1981-4178.2019.17013

Rastogi, L., & Rastogi, R. K. (2005). *Milk production, milk composition and meat production from buffaloes (Buffalypso) in Trinidad, West Indies* (No. 1871-2017-5204). https://ageconsearch.umn.edu/record/264136/

Rathod, A., Vaidya, M., & Ali, S. (2018). Genetic Studies of Productive and Reproductive Attributes of Surti Buffalo in Maharashtra. *International Journal of Livestock Research, 8*(8), 309-314. DOI: 10.5455/ijlr.20171016061752

SAS. (1995). SAS user's guide for Windows environment 6.08 ed. Cary, SAS Institute Inc.

Singh, R., & Saini, A, K., (2020). Milk Production Performance of Nili Ravi Buffaloes at Large Herd Sized Farm of ICAR-CIRB, Sub Campus, Bir Dosanjh, Nabha (Punjab). *Veterinary Research International*, *8*(3), 224-228. https://krishi.icar.gov.in/jspui/bitstream/123456789/66572/1/27-vriArticle_12.pdf

Verma, M, K., Sachdeva, G. K., Yadav, A, K., Gautam, S., Ali, M, M., & Kumar, S. (2017). Effect of genetic and non-genetic factors on milk yield and milk constituents in Murrah buffalo. *Indian Journal of Animal Research, 51*(2), 387-390. DOI: 10.18805/ijar.9297

AUTHOR CONTRIBUTION

Conception and design of research: AMV; analysis and interpretation of data: AMV; redaction of the manuscript: AMV.

CONFLICT OF INTERESTS

The author declares the existence of no conflicts of interests.