FOCUSING OVER SOME PHYSIOLOGICAL AND PRODUCTIVE ASPECTS IN EGYPTIAN BUFFALOES HERD

HASSAN, HODA Z.[1], KAWTHAR A. MOURAD[1], M. F. SHARAF [2] AND E. A. KOTBY[3]

1 Animal Production Research Institute, Agricultural Research Centre, Ministry of Agriculture, Dokki, Giza, Egypt.
2 Agricultural Economics Research Institute, Agricultural Research Centre, Ministry of Agriculture, Dokki, Giza, Egypt.
3 Faculty of Agriculture, Ain Shames University, Cairo, Egypt.

(Manuscript received 16 September 2004)

Abstract

This investigation used 5417 records to study some physiological and productive aspects of Egyptian buffaloes herd at Mehallet Moussa Research farm, Animal Production Research Institute, Ministry of Agriculture, Egypt.

Means of calf birth weight, weaning weight, age at first calving, calving weight, calving interval and service period were, 35.6 kg, 87.3 kg, 39.9 month, 512.2 kg, 496 and 181 days, respectively.

Study of physiological aspects indicated that mean calf birth weight was affected ($p<0.01$) by year of birth, season and parity; calf weaning weight was affected ($p<0.01$) by year of birth and season; age at 1st calving was affected ($p<0.01$) by year of birth only; calving weight; calving interval and service period were affected ($p<0.01$) by year of birth, season and parity. Productivity study of the same herd indicated that milk production, lactation period and dry period were affected ($p<0.01$) by year of birth , season and parity.

INTRODUCTION

In Egypt, buffaloes are the main farm animals, this is due to their total milk production (about 65 %) with high percentage of milk fat (6 – 10 %) and the total meat production (about 40 %) produced by them (Fooda, 1996). Also, buffaloes have a resistance against most local diseases and can tolerate nuclear radiation (fooda, 1996).

Regardless of the genetically makeup of the Egyptian buffaloes, they could be faced by some environmental problems, (i. e. nutrition, climate, and management (Afifi *et al.*, 1978 and Osman, 1985).

More informations about productive and physiological aspects of Egyptian buffaloes are needed to carry out a successful plan for improving their performance .

This study tried to set light over some physiological and productive aspects ong their whole life and to what extent Egyptian buffaloes could respond to the different circumstances

MATERIALS AND METHODS

Experimental buffaloes herd in Mehallet Mousa Research Farm, Animal Production Research Institute, Ministry of Agriculture, Dokki, Giza,Egypt, were used in this investigation.

5417 Egyptian buffaloe records were utilized to study some physiological and productive aspects. Calf birth weight (BW) kg, calf weaning weight (WW) /kg, age at first calving (AFC) day calving weight (CW) /kg, calving interval (CI) and day service period (SP) were estimated to indicate physiological aspects. Total milk yield (TMY) and 305 day milk yield (305 MY) /kg, lactation period (LP) and dry period (DP) were estimated to measure the productive aspects. Year of birth, season and parity were studied as factors affecting the previous mentioned physiological and productive aspects in the Egyptian buffaloes. Year of birth was classified into 5 classes, Cy_1 (1971 - 1975), Cy_2 (> 1975 - 1980), Cy_3 (> 1980 - 1985), Cy_4 (> 1985 - 1990) and Cy_5 (>1990 - 1995). Seasons were stated as winter, spring, summer and autumn. Parity was classified into 4 classes, Cp_1 (1 - 3), Cp_2 (> 3 - 6), Cp_3 (> 6 - 9) and Cp_4 (> 9).

Data were analyzed by least square means and maximum likelihood program (Harvey, 1990) according to the following linear model:

$Yijklm = \mu + Yi + Sj + Pk + Eijklm$

Where:

Yijklm= is the observation of the ijklm subclasses

μ = overall mean,

Yi = fixed effect due to the year of birth (I = 1,2,....., 5 classes)

Sj = fixed effect due to season (j = 1, 2,....,4 seasons)

P_k = fixed effect due to the parity, (k= 1, 2, 3,....., 4 classes)

Eijklm =random error assumed N.I.D, (0 ,6e2) .

RESULTS AND DISCUSSION

A- Physiological aspects

1- Birth Weight the overall mean of pirth weight is 35.6 kg (Table 1). This weight is heavier than that reported py zeidan (1990) in Egyptian buffaloes (33.2 kg), and Gogoi *et al.* (1987) in Indian buffaloes (30.7 kg).

Calf birth weight was significantly ($p < 0.01$) affected by year of birth, season of birth and parity of dam (Table 1). These agreed with those published by Kotby *et al.* (1988) and Hoda (1989) in Egyptian buffaloes, and Gogoi *et al.* (1987), in Indian buffaloes. Results in Table 2 showed that the heavier birth weight was observed during a period from 1971 - 1975, many factors could interact with this result (management, inbreeding,.....etc.).

The present study indicated that calves born during spring were heavier than those born in the other seasons, this may be due to the type of feeding.

Table 2 showed that calf birth weight was increased with advanced parity, this may be due to the increasing in live body weight, this was in agreement with Zeidan (1990**).**

2- Weaning Weight the least square mean of calf weaning weight is 87.35kg (Table 1). Year of birth ($p < 0.01$), calving season ($p < 0.05$), effect of weaning weight and calving weight of dam did not affect weaning weight (Table 1). This is in agreement with that reported by Tantawy (1984) in Egyptian buffaloes (93.6 kg for buffaloes weaning weight).

The heaviest weaning weight was observed during 1971 - 1975, this because it must be correlated with birth weight in the same interval (Table 2). Results in the same table indicated that weaning weight during summer was the heaviest, this is due to the heavier calf weight during spring.

3- Age at first calving the overall mean of age at first calving (Table 1) is 39.9 months, meanwhile, Ibrahim (1989) observed that Egyptian buffalo-heifers kept under a good plan of nutrition succeeded to conceive at about 18.25 months of age.

The higher average of age at first calving obtained in the present study may be due to retardation of growth of heifers which led to a delaying in sexual puberty and sexual maturity; good management could improve this criteria .

Age at first calving is influenced ($P < 0.01$) only by the year of birth (Table 1) such differences could be due to annual environmental changes, (Temperature, humidity, day light length, nutrition and management).

Results obtained in Table 2 indicated that age at first calving was the longest during a period > 1985 - 1990, these may be due to some feeding problems during this interval.

4- Calving body weight the overall mean of calving body weight is 512.2 kg, this is higher than that reported by El-Fouly and Afifi (1977) and Kotby *et al.* (1988) in Egyptian buffaloes, they stated 475 kg and 483 kg, respectively .

Calving body weight was influenced ($P < 0.01$) by the year of birth, season and parity (Table 1).

The period from 1971 - 1975 showed the best calving weight (526.7 kg), this was in a harmony with the results obtained in this study referring to birth weight, weaning weight and age at first calving; spring and summer showed the heaviest weight at calving (Table 2). Hoda (1989) found that buffalo- calving during spring and summer had the highest calving body weight, while, winter calves had the lowest weight, parity >7 - 9 showed the heaviest weight at calving (551 kg).

5- Calving interval Table 1 shows that the overall least square means of calving interval is 496.3 days, this is in contrast with El-Menshawy (1994) who found that the average of calving interval in Egyptian buffaloes was 402 days. The longer interval obtained in this study may be due to the longer service period which could be reduced by improving nutrition, service at the appropriate time and sex hygiene (Kotby *et al.,* 1988).

Year of birth, season and parity have a significant influence ($P < 0.01$) on calving interval (Table 1). Calving interval decreases with advancing of the year of birth, season and parity (Table 2). These were in agreement with those reported by El-Menshawy (1994) in Egyptian buffaloes and Roy Choudhury *et al.* (1971) in Italian buffaloes.

6 - Service Period the overall least square means of service period obtained in this study is 181.5 days (Table 1) compared with El-Menshawy (1994) and Fooda (1996) who stated that the average of service period in Egyptian buffaloes was 91.8 and 176 days. The prolonged service period obtained in this study may be due to poor estrus detection, silent heat and some other physiological management (Kotby *et al.*, 1988).

Table 2 shows that service period decreases with advancing year of birth, season and parity; this means that there was an improving in reproductive management during a period of 1971 - 1994.

Table 1. Overall means and factors affecting some productive and physiological aspects in Egyptian buffaloes .

Items	Factors			
Physiological aspects.	Overall mean	Year of birth	Season	Parity
Birth weight (kg).	35.6 ± 0.2	**	**	**
Weaning weight (kg).	87.3 ± 0.4	**	*	-
Age at first calving (month).	39.9 ± 0.3	**	n.s	-
Calving weight (kg).	512.2 ± 0.7	**	**	**
Calving interval (day).	496.3 ± 3.7	**	**	**
Service period (day).	181.5 ± 3.0	**	**	**
Productive aspects				
Total milk yeild (kg)	1525.2 ± 67.8	**	**	**
305 milk yield (kg)	1460.5 ± 74.2	**	**	**
Lactation period (day)	254.6 ± 11.3	**	**	**
Dry period (day)	205.1 ± 5.1	**	**	**

** .(P<0.05) * .(P<0.01) ns: not significant

Table 2. least square means of some physiological aspects in Egyptian buffaloes as affected by some factors.

Factors affecting physiological aspects	Least squares means and standard errors of physiological aspects					
	BW (kg)	WW (kg)	AFC (month)	CW (kg)	CI (days)	SP (days)
Year of birth						
y_1	38.4 ± 0.9	91.6 ± 2.7	38.6 ± 0.9	526.6 ± 8.4	542.0 ± 13.1	223.23 ± 13.60
y_2	36.1 ± .5	88.2 ± 1.4	39.2 ± .9	524.2 ± 5.6	515.4 ± 8.5	197.5 ± 8.5
y_3	33.8 ± .4	83.9 ± 1.2	40.9 ± 1.6	490.3 ± 5.3	491.2 ± 8.0	176.2 ± 8.1
y_4	35.2 ± .6	86.6 ± 1.7	43.5 ± 1.4	489.5 ± 5.5	477.4 ± 11.2	166.7 ± 10.5
y_5	34.6 ± 1.0	87.8 ± 1.4	34.4 ± 1.4	512.2 ± 3.8	356.3 ± 13.3	107.6 ± 9.8
Season of birth						
Winter	35.8 ± 0.2	86.2 ± 0.7	40.4 ± 0.4	459.9 ± 4.1	507.4 ± 4.7	192.5 ± 4.2
Spring	36.2 ± 0.3	86.9 ± 0.7	39.9 ± 0.5	524.3 ± 4.1	516.9 ± 5.1	201.5 ± 4.6
Summer	35.7 ± 0.3	88.2 ± 0.8	39.9 ± 0.6	522.8 ± 4.9	482.8 ± 5.9	168.3 ± 5.5
Autumn	.4.9 ± 0.3	86.1 ± 0.6	39.5 ± 0.4	505.9 ± 4.2	478.3 ± 4.6	163.7 ± 4.0
Parity						
p_1	32.1±0.4	----------	----------	440.8 ± 3.2	538.1 ± 5.2	223.8 ± 4.7
p_2	37.1±0.4	----------	----------	535.8 ± 4.8	478.0 ± 6.2	162.9 ± 6.3
p_3	37.3±0.7	----------	----------	551.5 ± 9.5	473.8 ± 10.2	158.7 ± 10.0
p_4	36.9±1.0	----------	----------	538.3 ± 14.5	493.6 ± 14.7	178.6 ± 14.5

B- productive aspects

1-Total production and 305 days milk yield

The overall least square means of total milk production and 305-days milk yield are 1525.8 and 1460.5 Kg, respectively (Table 1). This is much higher than those reported by Mostageer *et al.* (1981), 1227 kg and Sadek *et al.* (1993), 1395 Kg in Egyptian buffaloes and Popovici (1993), 1123 Kg in Romanian buffaloes; this may be due to that the experimental buffaloes Egyptian herd meet some genetic or environmental improvement.

Results in Table 1 reveals that, year of birth, season and parity affected significantly on total milk yield and 305 days milk yield. On the other hand, results in Table 3 shows a gradual decrease in total milk yield and 305-days milk yield from 1971 up to 1990, autumn and parity more than 9 had the lowest milk production, environmental, and heredity factors could interact with this result. Productive variations between years were stated by (Mostageer *et al.,* 1981 and Sadek *et al.,* 1993) in Egyptian buffaloes.

2- Lactation Period

Overall least square mean of lactation period obtained in this study was 254.6 days (Table 1). The present estimate is longer than the values reported by Mostageer *et al.* (1981) and El-Menshawy (1994) in Egyptian buffaloes. They found that average of lactation periods in Egyptian buffaloes were 217 and 244 days, respectively. Results obtained in Table 1 revealed that year of birth, season and parity, had a significant effect on lactation period. Results in Table 3 show that the longest lactation period was observed at interval 1971 - 1975, the shortest lactation period was observed during the interval > 1990 - 1995, autumn, parity more than 9 (185, 237 and 205 days, respectively); mean while the longer lactation period was observed during interval of 1971 - 1975, spring season and buffaloes, cows had 1 - 3 parity (341, 268 and 286 days, respectively), Mourad *et al.* (1990), Mostageer *et al.* (1981) and El-Menshawy (1994) came to similar findings in Egyptian buffaloes .

3- Dry Period

The overall least square mean of dry period in this study is 205.1 days (Table 1). This estimate is shorter than those reported by Kotby *et al.* (1988) in Egyptian buffaloes.

Year of birth, season and parity affect ($p < 0.01$) dry period. The shorter dry period was observed during 1971 - 1975 (162 days), summer season (194 days) and in buffaloes, cows have more than 9 parity (137 days). These agreed with those obtained by Mourad *et al.* (1990) in Egyptian buffaloes.

Table 3. Least square means of some productive aspects in Egyptian buffaloes as affected by some factors.

Factors	Least squares means and standard errors of Productive aspects			
	TMY (kg)	305MY (kg)	LP (days)	DP (days)
Year of bith				
Cy_1	1891.7 ± 82.9	1702.28 ± 70.70	341.9 ± 9.2	162.81 ± 15.6
Cy_2	1682.8 ± 47.8	1566.9 ± 40.5	294.6 ± 6.5	178.8 ± 9.5
Cy_3	1416.7 ± 44.1	1384.6 ± 35.8	235.5 ± 6.0	217.9 ± 9.3
Cy_4	1285.9 ± 59.4	1296.3 ± 48.3	201.2 ± 7.9	247.3 ± 11.7
Cy_5	1405.5 ± 55.0	1326.11 ± 46.9	185.9 ± 7.6	222.0 ± 12.2
Season of birth				
Winter	1528.6 ± 29.6	1444.7±23.1	258.9 ± 4.1	215.3 ± 5.9
Spring	1609.8 ± 30.3	1518.4 ± 25.8	268.8 ± 4.2	210.1 ± 6.1
Summer	1546.9 ± 32.6	1489.5 ± 27.8	252.7 ± 4.5	194.9 ± 6.6
Autumn	1415.4 ± 28.7	1389.5 ± 4.9	237.9 ± 4.0	200.0 ± 5.8
Parity				
Cp_1	1549.5± 38.3	1417.8± 32.7	286.5± 5.3	298.3± 5.2
Cp_2	166.7± 35.6	1596.2± 27.8	262.7± 4.5	189.8± 6.7
Cp_3	1450.9±n 64.9	1437.3± 55.4	230.9± 8.9	149.7±13.9
Cp_4	1348.8± 96.8	1251.2± 82.6	205.3± 13.3	137.2± 20.5

Finally it could be concluded that Egyptian buffaloes are exposed to different factors which affect their performance, so, more efforts must be carried out to improve their productive and physiological aspects to give.their best performance under their local circumstances .

REFERENCES

1. Afifi, Y. A., M. A. El-Ashry, M. A. El-Fouly, A. K. Kirrela, and I. A. Abou - Selim. 1978. The effect heifers. Agr. Research Review, 56 (7): 39 - 49.

2. El-Fouly, M. A. and Y. A. Afifi. 1977. The effect of age and weight at first calving on the productive and reproductive performance of primiparous buffaloes. Egypt. J. Anim. Prod., 17 (2) : 117 - 124.

3. El-Menshawy, S. M. S. 1994. Studies on productive and reproductive efficiency of Egyptian buffaloes. Ph. D., Thesis, Zagazig Univ., Egypt.

4. Fooda. 1996. Studies on growth and milk production in Egyptian buffaloes. M. Sc. Thesis, Animal Breeding, Fac. Agric., Ain Shams University.

5. Gogoi, P. K, K. S. Johar and A. Singh. 1987. Factors affecting birth weight in Murrah buffaloes calves. Indian Vet. Med. J., 11 (1): 20 - 24 (A. B. A., 56 : Abstr. No. 1968).

6. Harvey, W. R. 1990. MIXMDL. Mixed Model Least Squares and Maximum Likelihod Computer Program, Pc2. Ohio State Univ, Columbus, USA (Memeograph).

7. Hassan. Hoda, Z. 1989. Productive and reproductive performance of primiparous buffaloes M. Sc., Thesis, Fac. Agric., Ain Shams Univ., Cairo, Egypt.

8. Ibrahim, N. 1989. Puberty and associated phenomena in Egyptian buffaloes. M. Sc. Thesis, Ain Shams Univ, Egypt.

9. Kotby, E. A. A., H. E. El-Sobhy, Kawther A. Mourad and Lila N. Eid. 1988. Milk yield in two herds of Egyptian buffaloes in different locations. Intern. Symp. on Constraints and possibilities of Ruminant production in the Dry Subtropics, Cairo, Egypt.

10. Mostageer, M. A., M. A. Morsy and R. R. Sadek. 1981. The production characteristic of herd of Egyptian buffaloes. Sonderdruck aus zeitschrift fur tierjuichtung and zuchtungs biologie, 98: 220 - 236.

11. Mourad, K. A., Mohamed, M. M, and A. S. Khattab. 1990. Genetic parameters for milk roduction traits in a closed herd of Egyptian buffaloes. Egypt. J. Anim. Prod., 28: 11 - 20.

12. Osman, A. M. 1985. Breeding buffaloes in the New Valley desert area of Egypt. (Pattern of production and reproduction). Assuit Vet. Med. J. ,14 (28): 187 - 201. (A.B.A. 86: 2169).

13. Peeva, T. S. 1981. Dairy performance correlation factors for calving season and age. (A. B. A., 49: 1204).

14. Popovici, I. 1993.The influence of the month of calving on some performance in buffaloes cows production .Proceeding of the International Symposium on,Prospects of buffalo production in the Mediterranean and Middle East. Cairo, Egypt 9 - 12 November 1992. 62: 242 - 245.

15. Roy Choudhury, P. N., B. S. Mathur and S. N. Deshmukh. 1971. Some environmental factors affecting calving interval and lactation length in Italian buffaloes. Indian Vet. J., 48 : 711 - 716.

16. Sadek, R. R., K. A., Mourad, M. A. M., S. Ibrahim, Abou-Baker, and A. S. Abdel-Aziz. 1993. Enetic parameter of milk yield of Egyptian buffaloes calculated from daily and monthly test date records. Proceedings of International Symposium, Prospects of buffaloes of buffaloes production in the Mediterranean and Middle East. Cairo, Egypt 9 - 12 November 1992, 62: 108 - 110.

17. Tantawy, M. A. M. 1984. Studies on some productive traits in Egyptian buffaloes. M. Sc. Thesis, Zagazig Univ., Banha Branch , Moshtoher, Egypt.

18. Zeidan, S. M. 1990. Study of production performance of Egyptian buffaloes. M. Sc. Thesis, Zagazig Univ, Banha Branch, Egypt.

رؤية على بعض الظواهر الفسيولوجية والإنتاجية لقطيع من الجاموس المصرى

هدى زكى حسن[١]، كوثر عبد المنعم مراد[١] ، محمد فهيم شرف[٢]، السيدعبد الرحيم قطبى[٣]

١ معهد بحوث الإنتاج الحيوانى ، مركز البحوث الزراعية – وزارة الزراعة – الدقى– الجيزة – مصر
٢ معهد بحوث الاقتصاد الزراعى ، مركز البحوث الزراعية – وزارة الزراعة – الدقى– الجيزة – مصر
٣ كلية الزراعة – جامعة عين شمس .

استخدم عدد ٥٤١٧ سجلا لدراسة بعض المظاهر الفسيولوجيه والانتاجيه لقطيع من الجاموس المصرى فى محطة بحوث تربية الجاموس بمحلة موسى التابعة لمعهد بحوث الإنتاج الحيواني – وزارة الزراعة – مصر

كانت متوسطات الوزن عند الميلاد والوزن عند الفطام ٣٥,٦ و٨٧,٣ كيلوجرام ، على التوالي ، وكانت متوسطات العمر عند أول ولاده ٣٩,٩ شهراً والوزن عند الولادة ٥١٢ كيلوجرام وكانت متوسطات الفترة بين ولادتين والفترة بين الولادة وأول تلقيح هما ٤٩٦,٣ ، ١٨١,٥ يوماً على التوالي.

كان متوسط كل من إنتاج اللبن السنوي والإنتاج عند ٣٠٥ يوماً هما ١٥٢٥ ، ١٤٦٠ كيلوجرامًا اما متوسط كل من طول موسم الحلب وفترة الجفاف ٢٥٤ ، ٢٠٥ يومًا على التوالي. تأثر وزن الميلاد معنويا بسنة وموسم الولادة وأيضا بترتيب الولادات. كما تأثر وزن الفطام بسنة وموسم الولادة. وقد تأثر العمر عند أول ولادة بسنة الولادة فقط.

تأثر وزن الام عند الولادة والفترة بين ولادتين وفترة التلقيح معنويا بسنة وموسم الولادة وأيضا بترتيب الولادات.

اما من حيث الأداء الإنتاجي لنفس القطيع فقد تأثر إنتاج اللبن معنويا بسنة الولادة والموسم وترتيب الولادات. تأثرت صفات طول فترة الحليب وفترة الجفاف بسنة وموسم الولادة وترتيب موسم الولادة.