

ANALYSIS OF MILK RECORDS OF BUFFALOES COLLECTED UNDER DIFFERENT PRODUCTION SYSTEMS

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SUMMARY

A total of 3526 lactation records of 2179 buffaloes in 51 herds in 8 governorates under four production systems were recorded by the Cattle Information System/Egypt (CISE) of the Faculty of Agriculture, Cairo University during the period from 1990 to 2006. The records were used to estimate non-genetic effects on total milk yield of recorded Egyptian buffaloes. The highest least squares means of total milk yield was 2044 kg milk in Fayoum governorate, while the lowest was 1444 kg milk in Ismalia governorate. The differences between least squares means of total milk yield in different production systems was highly significant ($p < 0.01$). The least squares means of total milk yield of commercial, experimental, flying and small holder production systems were 1844, 1328, 1993 and 1770 kg, respectively. The least squares means of total milk yield of buffaloes in the first six parities ranged from 1579 kg for the first parity to 1808 kg for the sixth parity.

Keywords: *Total milk yield, Egyptian buffalo, fixed effects, production system*

INTRODUCTION

The contribution of buffalo to total milk production in Egypt is around 50 per cent (FAOSTAT 2008). According to the FAOSTAT (2008) the Egyptian buffaloes contribute about 2.5 and 8% of the world buffalo's milk and meat, respectively. Information about the phenotypic and genetic parameters of various economic traits is essential for the selection of higher productivity and efficient production systems. The formulation of breeding plans and genetic improvement necessitate defining and analyzing the production systems of Egyptian buffaloes. The aim of this research was to study phenotypic parameters of total milk yield of buffalo under different production systems in Egypt.

There are different buffalo production systems in Egypt. The first is the traditional crop/livestock system (small holders) which is traditionally integrated with the dominating agricultural system. It contains about 96% of the cattle and buffalo population and produces about 70% of the total domestic milk output. The second system is the intensive production system which contains large commercial farms. Commercial farms contain about 4% of the total cattle and buffalo population but produce about 30% of the marketable milk. The third system raising buffalo is called flying system. In this system, buffaloes are put under very intensive feeding regimes

to produce high-fat milk. The fourth production system is experimental farms which keep the buffalo for educational, training and research purposes.

MATERIALS AND METHODS

Data

This study was carried out using milk production records of buffalo herds recorded by the Cattle Information System/Egypt (CISE) of Cairo University, Faculty of Agriculture during the period from 1990 to 2006, which were used to estimate non-genetic parameters of total milk yield of recorded Egyptian buffaloes.

The data comprised 3526 lactation records of 2179 buffaloes in 51 herds at 8 governorates under four production systems were used. The animals under small holder system in the same village considered as one herd. The eight governorates were Elbehera, Baniswif, Fayoum, Giza, Ismalia, Kaliobia, Elminia and Sharkia. The four production systems were commercial, experimental, flying and small holder herds (Table 1). Parities included the first six lactations.

Table 1. Distribution of herds in different production system by governorates

Governorate	Production System				Total
	Commercial	Experimental	Flying	Small holder	
Elbehera	2	1	-	7	10
Baniswif	2	-	-	2	4
Fayoum	1	-	-	4	5
Giza	3	4	7	5	19
Ismalia	2	-	-	-	2
Kaliobia	2	1	-	-	3
Elminia	1	-	-	5	6
Sharkia	2	-	-	-	2
Total	15	6	7	23	51

This study was focused on estimating total milk yield of Egyptian buffaloes under different production systems.

Statistical Analysis

1- The following fixed model was used to estimate the least squares means of total milk yield of buffaloes in different governorates, production systems and parities; using the General Linear Model (GLM) procedure (SAS, 2001).

$$Y_{ijklm} = \mu + G_i + S_j + P_k + YS_l + e_{ijklm}$$

Where:

Y_{ijklm} = observation of total milk yield;

μ = overall mean;

G_i = fixed effect of governorate i , ($i=8$);

S_j = fixed effect of production system j , ($j=4$);

P_k = fixed effect of parity k , ($k=6$ parities);

YS_l = fixed effect of year-season of calving l , ($l=32$) and

e_{ijklm} = random residual effect.

RESULTS AND DISCUSSION

The least squares means of total milk yield of recorded buffalo ranged from 2044 kg milk in Fayoum governorate to 1444 kg milk in Ismalia governorate (table 2). The difference in total milk yield between governorates is due mainly to the environment, management and prevailing production systems.

Table 2. Least squares means(X) of total milk yield (kg) and their standard error (SE) of buffaloes in eight governorates

Governorate	No. of records	X (kg)*	SE
Fayoum	334	2044 ^b	36
Giza	1496	1873 ^c	21
Elminia	318	1846 ^{ce}	36
Kaliobia	385	1767 ^{ef}	35
Baniswif	229	1652 ^a	41
Sharkia	46	1639 ^{af}	77
Behera	660	1603 ^a	27
Ismalia	58	1444 ^d	68

* Means followed by different letters differ significantly ($p < 0.01$).

Table 3 shows the least squares means of total milk yield in different types of buffalo production systems in Egypt. The highest production was 1993 kg milk yield for flying herds which raise very highly producing buffaloes. The flying herds use good management and high quality feed to produce more milk. This system is usually located in the outskirts of cities. Also, the lactation period was the longest (326 day) in this system. While the least squares means of total milk yield of buffalo under commercial herds was 1844 kg milk. These commercial herds have high producing animals, good management, and nutrition system and use machine milking.

Table 3. Least squares means (X) of total milk yield (kg) and their standard error (SE) and average lactation period (LP) in days of buffaloes under different production systems

Production systems	No. of records	X (kg)*	SE	LP, day
Commercial	1340	1844 ^a	25	293
Experimental	472	1328 ^b	34	255
Flying	307	1993 ^c	37	326
Small holders	1407	1770 ^d	26	319

* Means followed by different letters differ significantly ($p < 0.01$).

Small holdings are the dominant production system in Egypt as it contains about 95% of the total number of buffaloes in Egypt. The least squares means of total milk yield of buffaloes under this system was 1770 kg which is lower than the average milk yield of all buffalo herds (1884 kg). The buffaloes raised under this system usually receive special attention from the farmer and his family. Buffaloes under experimental herds had the lowest milk production (1328 kg). The differences

between least squares means of total milk yield in different production systems was highly significant ($P < 0.01$). Galal and Elbeltagy (2006) observed the same characteristics of different buffalo's production system in Egypt.

Table 4. Least squares means (X) of total milk yield (kg) and their standard error (SE) of buffaloes for different parities

Parity	No. of records	X (kg)*	SE
1	347	1579 ^d	34
2	383	1718 ^b	33
3	590	1722 ^b	29
4	677	1780 ^c	28
5	593	1795 ^c	28
6	936	1808 ^c	27

* Means followed by different letters differ significantly ($P < 0.01$)

Table 4 shows the least squares means of total milk yield of buffalo in different parities. Under different production systems the number of parities of Egyptian buffaloes ranged from 1 to 6 parities. The total milk yield increases gradually from the first to the sixth parity. The least squares mean of total milk yield of second parity was higher than the first parity by 8% and different significantly ($P < 0.0001$). No significant differences between total milk yield in second and third parities ($p = 0.92$). Slight significant increase of about 62, 77 and 90 kg in total milk yield from the second to the fourth, fifth and sixth parities, respectively. The differences between total milk yield of fourth, fifth and sixth parities was not significant ($P > 0.05$). Similar results observed by Badran *et al.* (2002).

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تحليل سجلات اللبن في الجاموس تحت نظم إنتاج مختلفة

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أستخدم فى هذه الدراسة ٣٥٢٦ سجل لبن لعدد ٢١٧٩ جاموسة فى ٥١ قطيع موزعة على ٨ محافظات ومرباة تحت أربع نظم إنتاج مختلفة ومسجلة فى مركز نظم معلومات الماشية/مصر، كلية الزراعة - جامعة القاهرة خلال الفترة من ١٩٩٠ الى ٢٠٠٦. استخدمت السجلات لتقدير التأثيرات الغير وراثية على إنتاج اللبن الكلى للجاموس المصرى. اعلى متوسط لإنتاج اللبن كان ٢٠٤٤ كجم لبن فى محافظة الفيوم، بينما اقل إنتاج لبن كان ١٤٤٤ كجم لبن فى محافظة الإسماعيلية. متوسطات إنتاج اللبن فى نظم الإنتاج المختلفة أظهرت اختلافات معنوية. متوسطات إنتاج اللبن الكلى لنظم الإنتاج التجارى، التجريبي، الزراية وصغار المربيين كانت ١٨٤٤، ١٣٢٨، ١٩٩٣ و ١٧٧٠ كجم لبن على التوالي. متوسطات إنتاج اللبن الكلى للجاموس فى أول ٦ مواسم حليب تراوحت من ١٥٧٩ كجم لموسم الحليب الأول الى ١٨٠٨ كجم لموسم الحليب السادس.