Estimation of breeding values of total milk yield of Egyptian buffalo under different production systems

By
Samy Abou-Bakr
Assistant Professor of Animal Breeding
Department of Animal Production
Faculty of Agriculture
Cairo University
Egypt

2008

INTRODUCTION
INTRODUCTION

• The contribution of buffalo to total milk production in Egypt is around 70 per cent.

• FAO noted that Egyptian buffaloes contribute to about 5 and 14% of the world buffalo's milk and meat, respectively.

INTRODUCTION

• There are different types of production systems to raising buffaloes in Egypt:

  1. The traditional crop/livestock system (small holders).

  2. The intensive production system (Commercial farm)

  3. Flying system

  4. Experimental farms
INTRODUCTION

1. The traditional crop/livestock system (small holders)
   - Small holdings and herds (1-5 heads/farm).
   - Contains about 96% of the total cattle and buffalo population.
   - Low producing native animals.
   - Family labor.
   - No recording for milk or for any other activities.

INTRODUCTION

- Low values of inputs and outputs.
- Surplus milk is sold at farm gate to middlemen at low price.
- Live animals are sold alive in village markets.
- Most services provided to the farmer by the MALR.
2. **The intensive production system**

- Contains large commercial farms of more than 50 heads each.
- Contains about 4% of the total cattle and buffalo population.
- Milk recording is practiced mainly for farm management purposes.
- Some dairy enterprises have dairy processing plants and feed mills.
- Many large dairy farmers are members of breeders associations or cooperatives.

3. **Flying system**

- Located at the outskirts of large cities.
- Buffaloes are put under very intensive feeding regimes to produce high-fat milk.
- Buffaloes are bought in milk and are sold for slaughter immediately after drying off.
- Through this system, much of the best animals are lost.
4. **Experimental farms**
   
   - The fourth production system is experimental farms which keep the buffalo for educational training and research purposes.

---

**INTRODUCTION**

**The aim of the study**

- This study was focused on calculating estimates of heritability, breeding values and the least squares means of total milk yield of Egyptian buffaloes under different production systems.
MATERIALS AND METHODS

- 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 genetic and 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 8 governorates were Elbehera, Baniswif, Fayoum, Giza, Ismalia, Kaliobia, Elminia and Sharkia.
• The four production systems were commercial, experimental, flying and small holder herds. Parities included the first six lactations.

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;
- \( \mu \) = 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.
2- The following repeatability animal model was used to estimate heritability, repeatability and breeding values using the Derivative-Free Restricted Maximum Likelihood (DF-REML) procedure (Meyer 2000).

\[ Y_{ijklm} = \mu + A_i + P_j + Y_{Sk} + H_l + e_{ijklm} \]

Where:

- \( Y_{ijklm} \) = observation of total milk yield;
- \( \mu \) = overall mean;
- \( A_i \) = additive genetic random effect of the individual \( i \);
- \( P_j \) = fixed effect of parity \( j \), \( \{j=6 \text{ parities}\} \);
- \( Y_{Sk} \) = fixed effect of year-season of calving \( k \), \( \{k=32\} \);
- \( H_l \) = fixed effect of herd \( l \), \( \{l=51\} \) and
- \( e_{ijklm} \) = random residual effect.

MATERIALS AND METHODS

RESULTS AND DISCUSSION
RESULTS AND DISCUSSION

Least squares means of total milk yield (kg) of buffaloes in eight governorates.

Least squares means (X) of total milk yield (kg) and average Lactation period (LP) in days of buffaloes under different production systems.
RESULTS AND DISCUSSION

Least squares means of total milk yield (kg) of buffaloes for different parities.

Estimates of heritability ($h^2$) and repeatability ($r$) of total milk yield for all buffalo herds and under different production systems.
Maximum and minimum estimates of breeding values of total milk yield (kg) for all buffalo herds and different production systems.