

# The effect of calving season on milk production in water buffalo (*Bubalus bubalis*)

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**ABSTRACT.** The influence of calving season on milk production and composition was studied in 16 adult (3<sup>rd</sup> lactation) water buffaloes from a single farm in southern Italy over a 3 yr period. The data were separated into two groups according to calving season: group A of animals that calved from winter to spring and group B of those that calved throughout summer and autumn. Daily milk production and lactation length over the whole period (1997-2000) were higher ( $P < 0.01$ ) in group B than in A (9.11 vs. 8.55 kg and 275 vs. 258 d), but milk fat content was higher ( $P < 0.05$ ) in A than B (8.88 vs. 8.41%). No differences between groups were observed in milk protein content (4.7%). It was concluded that the calving season had little effect on the net income from this herd.

Key words: water buffalo, milk production, calving season, fat content

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## Efecto de la estación al parto sobre la producción de leche en bufalos (*Bubalus bubalis*)

**RESUMEN.** Se evaluó la influencia de la estación al parto sobre la producción y la composición de la leche en 16 bufalinas adultas de la misma lechería en el sur de Italia durante tres años. Se subdividieron los datos en dos grupos de acuerdo al período de parto: grupo A de animales que parieron durante el invierno y la primavera y grupo B de aquellas que parieron durante el verano y el otoño. La producción de leche y la duración de la lactancia durante los tres años (1997-2000) fueron mayor ( $P < 0.01$ ) en grupo B que en el A (9.11 vs. 8.55 kg y 275 vs. 258 d), pero el contenido de grasa en la leche fue más alto ( $P < 0.05$ ) en el grupo A que en el B (8.88 vs. 8.41%). No se observaron diferencias entre los grupos en la concentración de proteína en la leche (4.7%). Se concluye que la estación al parto tuvo poco efecto sobre el resultado económico en este hato.

Palabras clave: Bufalos, producción de leche, estación al parto, contenido de grasa

### Introduction

The breeding of water buffalo in Italy, once considered a sign of marshy and poorly endowed land in good feed districts, today is becoming an activity with very good economic prospects due to profitability of the particular use for the milk of this species (Ferrara and Intrieri, 1976; Zicarelli, 1990; 1992). Because of the market for mozzarella, buffalo farming is now a profitable enterprise and is carried out in an organised manner with modern technology. In fact milk produced is totally transformed by the cheese industry mainly into "mozzarella" cheese (Maioli, 1994; Ferrara and Intrieri, 1974a;b).

Although the economic importance of buffaloes has long been known, very little work has been done to exploit the genetic potential of this animal by applying modern dairy farming practises for large scale dairy production. The purpose of this paper was to evaluate the influence of calving season on the quantitative and qualitative milk production in water buffalo.

### Materials and Methods

The trial utilized 16 females buffaloes reared in the same farm located in southern Italy, covering experimental observations for a three year period (1997-2000). The animals were divided into two groups of eight each according to their calving season: in the first (A) animals that calved during the end of winter and the beginning of spring, while in the second group (B) animals calved during the end of summer and the beginning of autumn.

All animals were fed the same type of diet which only differed according to the individual productive level. Milk yields were recorded and individual milk samples were collected monthly for determination of chemical composition (fat, protein and lactose) using the mid infrared spectroscopy technique (Milkoscan). Also the *mozzarella* kg index (PKM) was calculated using the following formula:

$$PKM = \text{kg milk} * \{ [3.5 * (\% \text{protein}) + 1.23 * (\% \text{fat}) - 0.88] / 100 \}$$

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All the collected data were analysed according to the following model using SAS software (SAS, 2000):

$$Y_{ijk} = m + a_i + b_j + (a_i * b_j) + e_{ijk}$$

where  $Y_{ijk}$  = trait observed;

$m$  = overall mean;

$a_i$  = i-m calving season effect (1, 2);

$b_j$  = j-m year effect (1...3);

$(a_i * b_j)$  = interaction effect;

$e_{ijk}$  = error effect.

The group means were obtained and the differences were compared by *t*-test.

## Results and Discussion

In Table 1 are included the mean results for each group in daily milk yield, length of lactation, contents of fat, protein and lactose, and PKM. Daily milk production and lactation length over the whole period (1997-2000) were greater ( $P < 0.01$ ) in animals of group B than in those of A (9.11 kg vs. 8.55 kg and 275 d vs. 258 d).

In the first year (1997-98), however, group A had a

slightly longer lactation length than group B (259 d vs. 253 d). In regard to milk composition, only fat levels were significantly ( $P < 0.05$ ) higher in milk of group A than of B (8.88 vs. 8.41%). No difference at all was observed between the two groups in mean protein content (4.70%) and only a tiny difference in lactose content (4.85 and 4.88%). Consequently, the PKM of group A (559 kg) was lower ( $P < 0.01$ ) than that of B (627 kg).

## Conclusions

The following conclusions may be drawn based on the present results:

"Milk yield of buffaloes calving in summer and autumn (group B) was slightly, but significantly, higher than that of animals calving in winter and spring (group A). Conversely, milk quality traits, particularly fat content, slightly favored group A. Therefore, calving season has little effect on farm income, since lower lactational milk yields (about 300 kg less) registered in group A are offset by higher fat content and by the higher prices (about 15% more) received for milk during the winter-spring period.

Table 1. Milk daily production (kg), lactation length (d), fat, protein, lactose content (%) and PKM (kg)

|         | 1997-98           |                   | 1998-1999         |                   | 1999-2000        |                  | 1997-2000         |                   | D.S.E.<br>(DF=18) |
|---------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|-------------------|-------------------|
|         | A                 | B                 | A                 | B                 | A                | B                | A                 | B                 |                   |
| Milk/d  | 8.90              | 9.15              | 7.91 <sup>A</sup> | 8.80 <sup>B</sup> | 8.85             | 9.38             | 8.55 <sup>A</sup> | 9.11 <sup>B</sup> | 0.27              |
| Lenght  | 259               | 253               | 258 <sup>a</sup>  | 272 <sup>b</sup>  | 257 <sup>A</sup> | 301 <sup>B</sup> | 258 <sup>A</sup>  | 275 <sup>B</sup>  | 8.24              |
| Fat     | 8.98 <sup>a</sup> | 8.22 <sup>b</sup> | 9.38 <sup>a</sup> | 8.65 <sup>b</sup> | 8.28             | 8.37             | 8.88 <sup>a</sup> | 8.41 <sup>b</sup> | 0.44              |
| Protein | 4.73 <sup>A</sup> | 4.45 <sup>B</sup> | 4.63 <sup>a</sup> | 4.84 <sup>b</sup> | 4.54             | 4.71             | 4.70              | 4.70              | 0.12              |
| Lactose | 4.83              | 4.88              | 4.82              | 4.85              | 4.90             | 4.91             | 4.85              | 4.88              | 0.08              |
| PKM     | 595 <sup>a</sup>  | 555 <sup>b</sup>  | 528 <sup>A</sup>  | 619 <sup>B</sup>  | 556 <sup>A</sup> | 709 <sup>B</sup> | 559 <sup>A</sup>  | 627 <sup>B</sup>  | 22                |

A,B =  $P < 0.01$ ; a,b =  $P < 0.05$

## Literature Cited

- Ferrara B. and F. Intrieri. 1974a. Caratteristiche Ed Impiego Del Latte Di Bufala. - Rivista Di Zootecnia E Veterinaria 1:15-30.
- Ferrara B. and F. Intrieri. 1974b. Caratteristiche Ed Impiego Del Latte Di Bufala. - Rivista Di Zootecnia E Veterinaria. 2:111-122.
- Ferrara B. and F. Intrieri. 1976. L'allevamento Bufalino In Italia. Atti Del Secondo Convegno Nazionale Dell'a.S.P.A. Dedicato Ai: "Problemi Dell'allevamento Ovino, Caprino E Bufalino". Bari, 17-20 Maggio.
- Maioli, M. 1994. Produzione Ed Utilizzazione Mondiale Del Latte Bufalino. Analisi Del Settore "Ismea-Latte".
- SAS. 2000. User's Guide - Ed. SAS Institute Inc. Cary N.C.
- Zicarelli, L. 1990. Considerazioni Sull'allevamento Bufalino. Edizioni Boccia.
- Zicarelli, L. 1992 - Recenti Acquisizioni Sull'attività Riproduttiva Nella Bufala. Atti 4° Meet. Naz. Su "Studio Dell'efficienza Riproduttiva Degli Animali Di Interesse Zootecnico": 9-39.