



COMMUNICATION

Characterization of buffalo production of northeast of Italy

Francesco Tiezzi, Alessio Cecchinato, Massimo De Marchi,
Luigi Gallo, Giovanni Bittante

Dipartimento di Scienze Animali. Università di Padova, Italy

Corresponding author: Dr. Massimo De Marchi. Dipartimento di Scienze Animali. Università di Padova. Viale dell'Università 16, 35020 Legnaro (PD), Italy - Tel. +39 049 8272614 - Fax: +39 049 8272633 - Email: massimo.demarchi@unipd.it

ABSTRACT - Aim of this study was to characterize the buffalo production in the Veneto region of Italy. Test day records of milk production traits (milk yield, protein, fat, and somatic cell count) of 845 buffalo cows from two herds were analyzed using a linear model. The effects included in the model were herd-test-day, days in milk, and parity. Days in milk was the most important source of variation for milk yield, protein, and fat. The patterns of milk yield traits across lactation followed the typical trend of buffalo cows. Results allowed a preliminary characterization of buffalo production in north of Italy.

Key words: Buffalo, Milk yield, Lactation curve.

Introduction – World population of domestic buffalo, *Bubalus bubalis*, is estimated to approach 170 millions of animals (Drost, 2007); the river buffalo and the swamp buffalo are the two main rearing systems worldwide. As reported by Catillo *et al.* (2002), in Italy buffaloes have been historically used in the exploitation of swamp areas of central and south of Italy for work, milk, and meat production, but currently they are mainly specialized for milk production. The economic relevance of buffalo in Italy is increasing as the price of milk from buffalo is twofold the price of cow milk. Profitability of buffalo milk is linked to production of typical cheese products (e.g. Mozzarella); moreover, no Europe milk quota has been settled for milk from Buffalo, which shows also a remarkable longevity (buffalo cow can produce up to 10 year). Buffalo milk is characterized by a greater fat (8.3-8.6%) and protein (4.5-4.8%) content with respect to cow milk, and milk yield at 270 d ranges between 2100 to 2300 kg of milk (Zullo, 2007; ANASB 2009).

Buffalo population in the Veneto region (northeast of Italy) accounts nearly one thousand controlled buffaloes (APA Treviso, 2009). Milk is used to obtain typical cheeses, sometimes mixed with cow milk. The aim of this work is to characterize the buffalo population in Veneto for production traits.

Material and methods – Data of two herds were composed of 10,241 test day information (milk yield, fat, protein, and somatic cell content) recorded on 845 cows by

Treviso breeders association (APA) from 2003 to 2008. Prior to statistical analysis, somatic cell count was transformed to somatic cell score (SCS) by base-2 logarithm. Data were processed using the GLM procedure of SAS (2003) according to the following linear model:

$$Y_{ijk} = \mu + \text{HTD}_i + \text{DIM}_j + \text{parity}_k + \text{parity}_k \times \text{DIM}_j + e_{ijk}$$

where Y_{ijk} =milk yield (kg), protein (%), fat (%), and SCS (point); μ =overall mean; HTD_i =fixed effect of herd test day ($i=1\dots 148$); DIM_j =fixed effect of the j th DIM ($j=1\dots 17$); parity_k =fixed effect of the k th parity ($k=1\dots 5$); $\text{parity}_k \times \text{DIM}_j$ =first order interaction; e_{ijk} =residual random error term $\sim N(0, \sigma_e^2)$. Buffalo cows which showed parity greater than 5 were included in class 5.

Results and conclusions – The average milk yield, protein and fat contents, and SCS were 7.61 kg, 4.69 and 7.56%, and 4.52, respectively. These figures are consistent with those reported by Rosati *et al.* (2002) and ANASB (2009) for Italian buffalo population.

Table 1 shows the ANOVA results for production traits. Most effects included in the linear model were significant ($P < 0.05$), and models accounted for 26 to 60% of total variation of traits considered. As highlighted by F value magnitude, the effect of DIM was the most important source of variation for milk yield and protein and fat contents,

Table 1. ANOVA for milk yield, protein and fat contents, and SCS (845 buffalo cows).

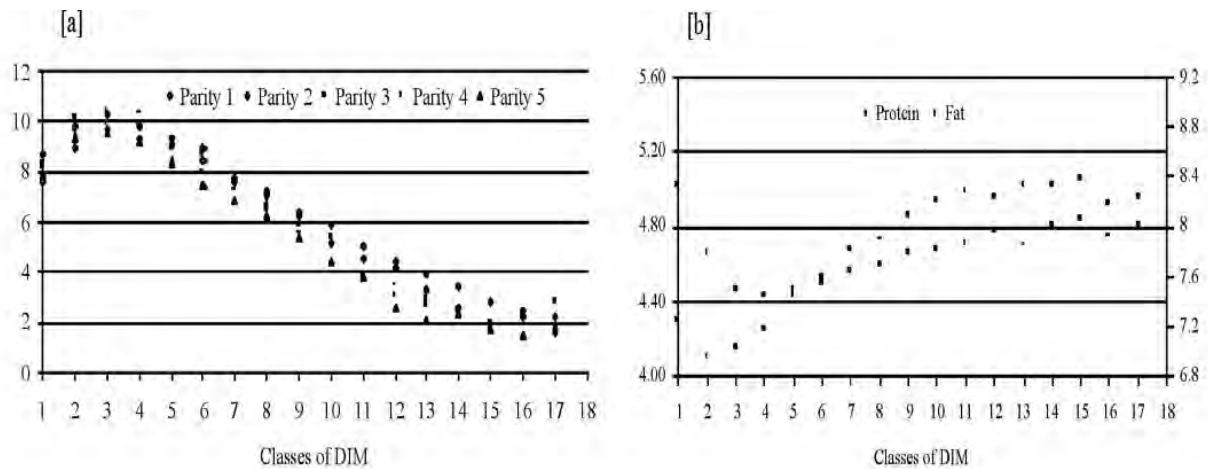
	Milk yield (kg)		Protein (%)		Fat (%)		SCS		
R ²	0.60		0.26		0.30		0.27		
RMSE ¹	2.27		0.38		1.21		1.70		
Effects	df	F	P-value	F	P-value	F	P-value	F	P-value
Herd-test-day	147	18.2	<0.001	12.0	<0.001	15.9	<0.001	17.9	<0.001
Days in milk	16	628	<0.001	63.9	<0.001	80.4	<0.001	17.9	<0.001
Parity	4	26.9	<0.001	34.1	<0.001	4.16	<0.01	58.8	<0.001
Parity x Days in milk	64	3.20	<0.001	1.26	n.s.	0.94	n.s.	1.36	<0.05

¹RMSE=root mean square error.

while parity was the most important source of variation for SCS.

The least square means of milk yield (Figure 1a) evidenced that production decreased across lactations according to Parlato *et al.* (2007). Evolution over time of milk yield follows the pattern of dairy animals, with a first ascending phase to the lactation peak and a subsequent decreased towards the dry off. The lactation curve of first lactation cows was more persistent compared to other lactations. The least square means for protein and fat contents (Figure 1b) evidenced a typical pattern for buffalo cows as reported by Catillo *et al.* (2002). Time evolution of protein content has an opposite trend in comparison with milk yield, while the pattern of fat content lacks the minimum about 3 weeks before peak of milk yield. Results allowed a preliminary characterization of buffalo production in north of Italy.

Figure 1. Least square means of parity by DIM interaction on milk yield (kg/d) [a] and least square means of DIM on protein and fat content [b].



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