MEAT PERFORMANCES OF BUFFALO ACCORDING TO MANAGEMENT SYSTEMS*

Performances de la carne de búfalo de acuerdo al sistema de cría

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Abstract

The attention towards the production of buffalo meat is recently increased as, at last, it is considered an occasion of a net profit; since now this aspect has been scarcely considered and, as consequence, buffalo nutrition and breeding techniques are still poorly known. The aim of the study is to estimate the feeding and management effects on buffalo performances and on meat quality. The trial was carried out on 23 male buffalo calves fed on *ad libitum* three different diets: maize silage, poliphyta hay and pasture, and slaughtered at about 360 days of age. The *in vita*, slaughtering and dissection data were recorded and the physical quality on muscle *longissimus thoracis* was determined. Buffalo calves fed on maize silage showed the best productive performances, if compared to the other two groups, while the animals fed on hay showed a higher meat percentage than the other two groups, +1.5% than pasture group and +4.1% than maize silage group, this last group showed higher fat percentage. The physical analysis of *longissimus thoracis* confirmed the good quality of buffalo meat, therefore hay feeding improved carcass and meat quality of buffalo calves balancing the low production when they compared with the animals fed on maize silage.

Key words: Buffalo calves, meat quality, management systems.

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Resumen

La atención hacia la producción de carne de búfalo ha aumentado recientemente como, por fin, es considerada una oportunidad para obtener un beneficio neto; porque hasta el presente este aspecto ha sido escasamente considerado y, por consecuencia, las técnicas de nutrición y reproducción de los búfalos son aun pobremente conocidas. El propósito de este estudio es de estimar los efectos de la alimentación y manejo sobre los rendimientos de los búfalos y sobre la calidad de su carne. El experimento fue realizado sobre 23 terneros bufalinos machos alimentados *ad libitum* con tres diferentes dietas: ensilaje de maíz, heno de *polifita* y pasto, y sacrificados a los 360 días de edad aproximadamente. Los datos de los animales vivos, a la matanza y al desposte fueron registrados y fue determinada la calidad física del músculo *longissimus thoracis.* Los terneros bufalinos alimentados con ensilaje de maíz mostraron los mejores rendimientos productivos, al compararlos con los otros dos grupos, mientras que los animales alimentados con heno mostraron un mayor porcentaje de carne que los otros dos grupos, +1.5% que el grupo en pastoreo y +4.1% del grupo con ensilaje de maíz, este último grupo reportó el mayor porcentaje de grasa. El análisis físico del *longissimus thoracis* confirmó la buena calidad de la carne de búfalo, por lo tanto, la alimentación con heno mejoró la calidad de la canal y la calidad de la carne de terneros bufalinos balanceando la baja producción cuando son comparados con los animales alimentados con ensilaje de maíz.

Palabras clave: Terneros bufalinos, calidad de la carne, sistemas de manejo.

INTRODUCTION

In Italy the buffalo is generally bred as a dairy animal, its milk being transformed into mozzarella cheese. But recently the attention towards the production of buffalo meat has increased and, at last, it is considered an occasion for a net profit; up to the present this aspect had been scarcely considered and, as a consequence, buffalo nutrition and management practices are still poorly known.

Researches carried out on the characteristics of buffalo meat have underlined its very good chemical and physical properties and they have proved that meat from this ruminant is a wholesome light and nourishing food [3, 5, 9]. The buffalo meat is more tender and lighter than beef and has lesser contents of cholesterol and fat besides it is a good amount of organic iron [2]. The aim of the study is to estimate the effects of different diets and practices on buffalo performances and on meat quality.

MATERIAL AND METHODS

The experiment was carried out on 23 male buffaloes slaughtered at about 12 months of age. The calves were weaned at three months and fed on three different ways: 8 animals were fed on maize silage *ad libitum*, eight animals were fed on poliphyta hay plus 500 g/d of maize grain for 100 kg of live weight. These first two group of animals were raised under feedlot conditions; the last 7 animals were fed on pasture with a supplement of maize grain (500 g/d every 100 kg of l. w.), in the summer the diet was integrated with grass hay, and then for the last three months without hay, as this group was slaughtered in November. All the animals received 800 g/d for 100 kg of live weight of a proteic supplement. The chemical composition of foodstuffs was reported in Table 1.

TABLE 1
Chemical composition of foodstuffs (% as fed)

	Dry matter	Crude protein	Ether extract	Ash	N-free extract	Crude fibre	NDF	ADF
Maize silage	33.5	2.7	1.1	1.6	21.6	6.5	15.7	9.0
Poliphyta meadow hay	86.9	12.0	1.6	5.7	44.1	23.4	51.5	28.8
Natural pasture	36.6	3.5	1.1	2.9	17.6	12.5	22.9	14.1
Maize grain	88.1	9	3.5	1.6	71.4	2.6	8.9	3.2
Protein supplement	87	38	3.5	9.5	25	12	20.4	9.5

In vita, slaughtering and dissection data and carcass evaluation were recorded following ASPA methodology [1]. At dissection (7 days after slaughter) physical quality parameters on muscle *longissimus thoracics* were determined:

- colour with C illuminant (lightness, chrome and hue using Minolta CR 300 colorimeter apparatus);
- water losses in raw (by dripping) and cooked meat (in water at 75°C for 50 minutes);

- hardness in raw and cooked meat with Warner Bratzler Shear accessory using Instron 1011 apparatus.

Data were examined by variance analysis using a GLM SAS procedure [6].

RESULTS AND DISCUSSION

The three buffalo groups were slaughtered at about 360 days (Table 2) and they showed similar fasted live weight and average daily gain (ADG) (on average: 250.5 kg and 590.63 g/d respectively), while the carcass weights and the net dressing percentage were significantly different because of the different percentage of gastrointestinal content (19.6 kg for group fed on maize silage vs 34.3 kg for the other two groups). The carcass weight of the animals fed on maize silage was higher than the animals fed on hay (+11 %) or the animals fed on pasture (+23 %); the net dressing percentage differed in average 1.7 percentage points among diets.

TABLE 2
Productive performances

Groups	Final live weight, kg	ADG kg/d	Carcass weight, kg	Net dressing %	Conform. score[1]	Fatness score[1]
Maize silage	255.6	603.5	130.6[a]	55.29[a]	6.1 (2+)	5.8 (2+)[a]
Hay	255.4	601.6	116.3[b]	53.48[ab]	6.4 (2+)	3.5 (1+)[b]
Pasture	240.6	566.8	102.6[c]	51.81[b]	5.5 (2)	3.1 (1+)[b]
Mean	250.5	590.63	116.5	53.53	6.0 (2+)	4.1 (2-)
RMSE	21.44	54.586	12.84	2.239	0.88	0.91

a, b: different letters mean significant difference (P<0.05).

1= In bracket valuation score (2=1-,....., 16=5+) ASPA 1991.

The conformation scores were similar among groups (2+), while the fatness score was higher in the buffaloes fed on maize silage than others (2+ *vs* 1+). Buffalo calves fed on maize silage showed the best productive performances, if compared to the other two groups and their *in vita* and slaughtering data, resulted similar to those reported by Gigli *et al*. [4] for 10 months old male buffaloes.

The carcass quantitative, yield parameters (Table 3) were, on the contrary, higher in the animals fed on hay than in the other two groups. This group showed highest percentage of hind quarter (48.3 % *vs* 46.6% for buffaloes fed on pasture and 46.9% for maize silage group) and meat (+1.5% and +4.1%), while in maize silage group the highest percentage of subcutaneous (+2.64% than hay group and + 3.3% than pasture group) and intermuscular (+1.6% than the two other groups) fat was recorded.

TABLE 3
Carcass quality

Groups	Side kg	Hind quarter [2]	Meat [2]	Subcut. Fat [2]	Intermus. Fat [2]	Bone [2]
Maize silage	64.3[a]	46.9[b]	57.6[c]	6.86[a]	7.36[a]	14.48
Hay	57.3[b]	48.3[a]	61.7[a]	4.22[b]	5.97[b]	13.69
Pasture	49.2[c]	46.6[b]	60.2[b]	3.55[c]	5.48[b]	14.05
Mean	53.3	47.3	59.9	4.87	6.27	13.94
RMSE	6.37	0.81	1.13	0.758	0.519	1.070

a, b: different letters mean significant difference (P<0.05).
2 : percentage on side weight (other tissues are not reported).

The physical quality values of *longissimus thoracis* (Table 4) showed the good quality of buffalo meat compared to the data reported in literature where differences between buffalo and beef are referred [3, 5]. An important result was the low cooking loss of the animals fed on hay (27.46 % *vs* 30.69%) and higher lightness than other groups (+4.8), while maize group samples had significantly the highest values of hue and chrome, particularly if compared to the grass-fed group (36.21 *vs* 28.34, 24.69 *vs* 22.49 respectively).

Raw meat of the animals fed on rough forage was tougher, but this adverse effect was annulled by cooking; cooked meat obtaining tenderness average value of 1.90 kg/cm^2 comparable to the data reported by Failla *et al*. [3] and Settineri *et al.* [7].

The carcass characteristics and the meat quality of buffalo calves fed on hay were noticeably good and they compensate the lower production of this group in respect to maize silage animals, which had fatter

TABLE 4
Meat quality (on longissimus thoracis muscle)

Groups	pH	Cooked loss %	Hardness kg/cm^2		Colour		
			Raw	Cooked	Lightness	Hue	Chrome
Maize silage	5.53^{c}	30.45^{a}	2.27^{b}	1.95	41.16^{b}	36.21^{a}	24.69^{a}
Hay	5.62^{b}	27.46^{b}	2.73^{a}	1.85	46.74^{a}	34.83^{a}	22.09^{b}
Pasture	5.74^{a}	30.93^{a}	2.53^{ab}	1.89	42.60^{b}	28.34^{b}	22.49^{b}
Mean	5.63	29.61	2.51	1.90	43.50	33.13	23.09
RMSE	0.083	1.488	0.340	0.461	2.052	2.602	1.488

a, b: different letters mean significant difference (P<0.05).

carcasses unlikely accepted by consumer. Moreover, the data from the grass-fed group are of some interest principally because of this economic raising system, low environmental impact and reduced number of workers, well follows the CEE indications on animal welfare and extensive agriculture.

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