

**BULLETIN OF THE FAO INTER-REGIONAL COOPERATIVE RESEARCH NETWORK ON BUFFALO**  
 INCLUDES SHORT COMMUNICATIONS, RESEARCH PAPERS, TECHNICAL NOTES, ONGOING RESEARCHES

## From the editor

I am the new Director of the Animal Production Research Institute of Rome, therefore I have taken in charge the coordination of the FAO Inter Regional Research network on Buffalo. I have accepted this task with great enthusiasm because I have believed from the beginning in the important role that the Buffalo Network plays in promoting buffalo research and development. In 1990-91 I have personally and directly collaborated to the creation of this Network together with the colleagues of FAO AGA, drs. Qureshi and Chupin. The previous coordinators, profs. Pilla and Rossi, together with the active participants from the member countries, have succeeded in

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## FIRST RESULTS OF AN INVESTIGATION ON PRODUCTIVE PARAMETERS OF BUFFALO FARMS OF LATIUM (ITALY)

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### INTRODUCTION

Latium, especially in its southern area, is the second Italian region as for the number (about 8%) of Mediterranean buffaloes (*Bubalus bubalis* L.) after the near region of Campania, where about 75% of animals reared in Italy are present. Buffalo milk is utilized for the cheese making of "mozzarella", that is much appreciated by consumers; considering these figures it is possible to understand the importance of this species in the animal production reality in this part of Italy.

In 1997 the local Council of Latium, together with the European Union, financed an experimental project for the development of buffalo breeding in the southern districts of the region. Istituto Sperimentale per la Zootecnia (Animal Production Research Institute of Rome), that is studying buffalo feeding systems (Bartocci et al., 1997; Terramoccia et al., 1999) and milk quality (Tripaldi et al., 1997) is participating in this project with a program entitled "Improvement of buffalo breeding and better use of dairy production". This research implies a scientific activity based on the study of feeding and

reproduction to be developed in farms of the above mentioned area.

The first action of the researchers has been to collect data on milk productive parameters of the farms participating in the program, so as to know the situation previous to their intervention and so as to perform the following experiments with an adequate knowledge of territory and of buffalo production characteristics. The present short report aims at offering information on milk yield, also in relation to the farm typology, in order to increase the knowledge of buffalo production reality in Latium.

### MATERIAL AND METHODS

The investigation has been carried out with data collected from 19 farms that have participated in the above mentioned project and kindly put at disposal by the Breeder Association of Latium region. The examined productive parameters of buffalo milk were: length of lactation; milk, fat and protein yield; fat and protein percentage of the years '94-'95 (1<sup>st</sup> year) and '95-'96 (2<sup>nd</sup> year). By analysing milk yield results and fat and

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establishing strong links between many research Institutes, contributing to the fervent activity which has taken place during the past six years, consisting in four symposia, one workshop, several meetings and the beginning of a few common research projects, as well as the publication of 12 issues of the "Buffalo newsletter". I thank all these people and the FAO Regional officers who have always provided the necessary financial support. I have been a researcher in buffalo production and reproduction for many years and I also have participated in the activities of the Buffalo Network. I appreciate the important role played by the "Buffalo newsletter" in the exchange of information on research strategies and results between different countries. We are receiving more and more subscription requests (we print now 1,200 copies) and an increasing number of researchers send their papers for publication. In this issue, for the first time, two research papers from two groups of researchers in Iraq are published. We think therefore that this bulletin is no more a mere newsletter but a magazine with a great potential as mean of communication between researchers, as it should be according to what was emphasised by FAO when the Network was established.

Finally I would like to give you the greetings of prof. G. Rossi, former Network coordinator, who wishes to thank all people of the member countries who have cooperated and participated in the activities of the Network and have contributed to a fruitful exchange of research experiences.

I look forward to receiving suggestions and cooperation in the future activities from the colleagues of the member countries and from all readers.

**Prof. Antonio Borghese**

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protein percentage, the "mozzarella" cheese yield has also been considered and estimated according to the equation proposed by Altiero et al. (1984). After a careful filtering process, the final sample resulted to be of 2109 complete lactations.

The 19 farms were grouped in three different typologies according to the number of buffaloes: small farms (8) with less than 50 head, medium farms (4) with a number of buffaloes between 50 and 100 and big farms (7) with more than 100 head.

The statistical software SAS (1993) was utilized for data processing using, in a monofactorial model, the GLM procedure for testing the statistical difference between farm typologies.

#### **RESULTS AND DISCUSSION**

In Table 1 general means of lactation days, productive and qualitative parameters and estimated "mozzarella" cheese yield are reported.

It can be noted that the length of lactation, especially for the 2<sup>nd</sup> year is very close to 270 days, that in Italy is considered the standard length.

The milk yield is quite satisfactory, on the average about 2324 kg/head/year (8.76 kg/head/d); the average value of fat content is 8.37% while protein content is 4.64%, in both years, resulting in an average yield of 198 kg/head/year for fat and 108 kg/head/year for protein. The average "mozzarella" cheese yield remains unchanged, about 598 kg/head/year, in both the examined years.

Considering buffalo production and quality data until 1989, Pilla and Moioli (1993), after examining 31,333 total lactation productions on whole national territory, found a lower value of average daily milk yield (7.30±3.18 kg) but a fat percentage of 8.57±1.71

and a protein percentage of 4.55±0.82, very close to our data.

As expected, the coefficients of variability are quite low for fat and protein content and high for the productive parameters (about 30%); by analysing these results the possibility of improvement of average yields can be expected both operating on more correct feeding systems and with an accurate selection.

Table 2 reports the estimated means of lactation days, of productive parameters and estimated "mozzarella" cheese yield for the three different farm typologies.

As far as the length of lactations is concerned there is statistical difference, among types of farms, only in the 2<sup>nd</sup> year with lower value for medium farms.

From other reported results it can be deduced that the best yield, in both examined years, were obtained in big farms (on the average 2458 kg/head/year). The medium farms had potentially the same characteristics of the small ones (on the average 2005 and 1948 kg/head/year respectively), because of the lower value of lactation days. The satisfactory yields of big farms are followed from a higher and statistical significant value of fat percentage while the milk protein percentage has a significant difference only in the 2<sup>nd</sup> year.

From these figures, in addition, big farms have higher values of fat and protein yield and so a higher amount of "mozzarella" cheese with a considerable difference, on the average about 138 kg/head/year, compared to small and medium farms. The better yields obtained in the big farms are probably due to the different technology applied: a more rational

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feeding of both milking and dry buffaloes, a division in groups of animals according to the lactation stage and in general more modern breeding techniques.

In conclusion, it can be said that the Mediterranean buffaloes in Latium have quite satisfactory yields and that farm dimensions seem to have an effect on the productive capacity of animals.

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**Table 1 - General means of lactation days, productive and qualitative parameters (head/year).**

		1 <sup>st</sup> YEAR	2 <sup>nd</sup> YEAR
lactation days		261.16±51.84	269.53±61.90
milk yield	(kg)	2317.09±629.37	2331.56±703.12
fat content	(%)	8.52±0.79	8.22±0.79
fat yield	(kg)	197.99±58.42	192.85±64.94
protein content	(%)	4.62±0.27	4.66±0.26
protein yield	(kg)	107.07±28.94	108.84±33.52
mozzarella cheese yield	(kg)	597.63±166.09	597.84±183.54

**Table 2 - Estimated means (head/year) of lactation days, productive and qualitative parameters of farm typologies.**

		FARM TYPOLOGY			RMSE
		Small	Medium	Big	
<b>1<sup>st</sup> YEAR</b>					
lactation days		260.31	258.61	261.83	51.88
milk yield	(kg)	1924.75 <sup>b</sup>	2041.54 <sup>b</sup>	2446.26 <sup>a</sup>	594.31
fat content	(%)	8.29 <sup>b</sup>	8.33 <sup>b</sup>	8.59 <sup>a</sup>	0.78
fat yield	(kg)	159.26 <sup>b</sup>	170.04 <sup>b</sup>	210.93 <sup>a</sup>	54.62
protein content	(%)	4.58	4.64	4.63	0.27
protein yield	(kg)	88.02 <sup>b</sup>	94.55 <sup>b</sup>	113.17 <sup>a</sup>	27.22
mozzarella cheese yield	(kg)	487.09 <sup>b</sup>	522.20 <sup>b</sup>	633.67 <sup>a</sup>	155.68
<b>2<sup>nd</sup> YEAR</b>					
lactation days		271.00 <sup>a</sup>	242.12 <sup>b</sup>	274.47 <sup>a</sup>	60.96
milk yield	(kg)	1970.81 <sup>b</sup>	1968.88 <sup>b</sup>	2470.74 <sup>a</sup>	666.89
fat content	(%)	8.02 <sup>b</sup>	7.91 <sup>b</sup>	8.31 <sup>a</sup>	0.77
fat yield	(kg)	158.49 <sup>b</sup>	155.32 <sup>b</sup>	206.59 <sup>a</sup>	61.06
protein content	(%)	4.51 <sup>c</sup>	4.64 <sup>b</sup>	4.70 <sup>a</sup>	0.26
protein yield	(kg)	88.86 <sup>b</sup>	91.11 <sup>b</sup>	116.09 <sup>a</sup>	31.42
mozzarella cheese yield	(kg)	489.36 <sup>b</sup>	492.72 <sup>b</sup>	638.68 <sup>a</sup>	177.80

a, b : P < 0.05

## PRESENCE OF UNUSUAL SECONDARY CONSTRICTION IN SMALLEST AUTOSOME OF SUBFERTILE MURRAH BUFFALO BULL (BUBABUS BUBALIS)

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### INTRODUCTION

Various chromosomal abnormalities associated with reduced fertility, infertility, etc. have been reported in buffaloes. Commonly reported chromosomal abnormalities are translocations, trisomies, monosomies, chimerism, pericentric inversion, etc. (Vijh et al., 1994; Prakash et al., 1992 & 1994; Vadav et al., 1990; Balakrishnan et al., 1981 & 1985). The effect of viral infections, pesticides, chemicals, aflatoxin B etc. on chromosomal morphology have also been studied by Yadav et al., 1985; Sikka et al., 1989; Gupta et al., 1988 and Sharma et al., 1991.

However, minor structural abnormalities such as enlarged or double satellites, elongation of secondary constriction, increase of heterochromatin and their clinical significance have not been reported in cattle or buffalo but have been reported in human population. Satellites are similar to the knobs found at the end of the arms of certain chromosomes; these knobs are tenuously connected by so narrow stalk as not to be resolved at the light microscope. Secondary constrictions are referred as the pinching of the arms of a chromatid in a different position from the centromere. In humans, the increase of heterochromatin is referred as "marker chromosome (mar)" (Lubs, 1969; Schmid et al., 1986). The marker chromosome is a structurally abnormal chromosome, smaller than a chromosome, which contains large amount of heterochromatin; most of the marker chromosomes are derived from the short arm region of the acrocentric autosome. Marker chromosomes have posed problems for human cytogenetists since 1970 (Plattner et al., 1993). These chromosomes are found in normal individuals as well as in patients with mental retardation, distinct dysmorphological appearance and infertility (Schinzel et al., 1981; Maraschio et al., 1981; Steinbach et al., 1983; Buckton et al., 1985). Several types of marker chromosome have been reported in humans (Lubs, 1969; Schreck et al., 1977; Plattner et al., 1993; Mcdermid et al., 1986). Chromosomal variants have not been reported in animals. A survey performed in Edinburgh (Scotland) revealed that the human population had 3 to 5% of identifiable chromosome variants (Court Brown et al., 1966). It has become possible to identify the same variants in animals because preparative techniques are more and more

improving and large number of dairy animals are being karyotyped (Kovacs and Szepeshelyi, 1987 and Patel, 1998). The present paper describes a cytogenetic finding similar to the human marker chromosome in Murrah bulls, observed through the routine screening of breeding bulls. To the best of our knowledge, this is the first report on polymorphisms in the small acrocentric chromosome no. 24.

### MATERIALS AND METHODS

A two year old buffalo bull reared as AI bull was investigated in routine screening. Chromosomal preparations were made by using standard whole blood culture in RPMI - 1640 medium supplemented with antibiotics, 15% fetal calf serum and pokeweed mitogen. The cultures were incubated at 37.5 degrees C for 72 hours. To increase the relative frequencies of prometaphase chromosomes, Ethidium bromide (10 µl/ml) was added (Hsu et al., 1973) and to arrest metaphase stage of the somatic cell division, Colchicine at 2 µl/ml was added to the culture for 3 and 1 hours respectively, prior to harvesting. The cells were separated by centrifugation at 150 g for 5 minutes, followed by hypotonic treatment with 0.56% KCl for 20 minutes and fixed in 3:1 ratio of methanol/glacial acetic acid, and finally suspension drops on slides were air dried. Routine GTG and CBG banding with little modification (Patel et al., 1995 and Patel and Khoda, 1998) were performed to identify the abnormality in the chromosome. The entire procedure was repeated twice at different times in order to confirm the observations. A detailed semen analysis was carried out using standard methods in the AI station where the bull was stationed. Semen volume, density, mass activity, sperm motility, sperm counts were recorded. Sperm morphology was also studied using eosin stain (Pandey et al., 1990).

### RESULTS

The investigated two year old buffalo was phenotypically normal with no visible genital malformation. The libido, semen volume, density, mass activity, sperm motility, sperm counts were normal. However, sperm morphology from fresh semen indicated a high degree of abnormal sperms. The majority had

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coiled tails (60%). Besides, 10% of the sperms had the following abnormalities: kinked and coiled middle parts, free heads, free tails, proximal and distal protoplasmic droplets and bent middle parts, narrow heads (see fig. I, J, K, L, M and N). Semen of the bull had poor freezibility. Cytogenetic investigation revealed that one third metaphase cells out of 160 cells screened under microscope had an unusual secondary constriction at the end of q arm of one of 24th chromosome pair (see fig. B). A few cells (5%) showed structural chromosomal abnormalities associated to other autosomes (fig. F, H), like chromatide gaps (fig. G). Although this gave the appearance of a satellites, the chromosome was never found in association with other acrocentric chromosomes. GTG banding confirmed an additional segment attached to the terminal end of q arm of the 24<sup>th</sup> chromosome (fig. C). The CBG banding indicated that the extra segment was C-band positive (fig. D). There was no sign of this anomaly in its homologue. A few aneuploid cells (4.5%) with 48 XY/ 49 XY/ 51 XY (fig. E) were also observed.

#### DISCUSSION

Several numerical or structural chromosome abnormalities in sex chromosomes or autosomes associated with infertility and reduced fertility have been reported in cattle and buffaloes. However, the minor structural abnormalities, particularly the increase in the amount of heterochromatin and its clinical significance has not been documented. Elongation of secondary constriction of one arm of chromosome no. 4 has been observed in several related river buffaloes by Balakrishna and Yadav (1984). However, the clinical significance has not been described. Similar observation was performed on chromosome no. 3 in two unrelated buffalo bulls of different breeds, Murrah and Meshana, and six local female buffaloes by Patel et al. (1997) and Patel and Khoda (1998). They described the clinical significance of variant chromosome no. 3 associated to mitotic disturbance which was a possible reason for reduced fertility in the bulls and infertility in the females. The origin of secondary constriction in the 24<sup>th</sup> chromosome of this bull is not known; presumably it could be because of the displacement (translocation) of one satellite to the chromatids of smallest chromosome as the diameter of these satellites was less than the width of the adjacent chromatids. Sire and dam of the bull were unfortunately not available for eventual linkage studies. Progeny was not available either due to the poor quality and freezibility of the semen. In human it is referred that marker chromosome is inherited, and it is possible that this aberration causes sperm abnormalities, as observed by Moeran and Teyssier (1992) where variation in length or amount of heterochromatin in D-group chromosomes is associated to male infertility. The presence of

aneuploid cells in this bull indicates mitotic disturbance.

Acknowledgement: the author would like to thank Mr. S.M. Patel, Lab Technician of Cytogenetics for his valuable help in performing various chromosomal techniques and Mr. Rajesh Jaiswal of the semen production station of Bidaj farm or providing semen samples.

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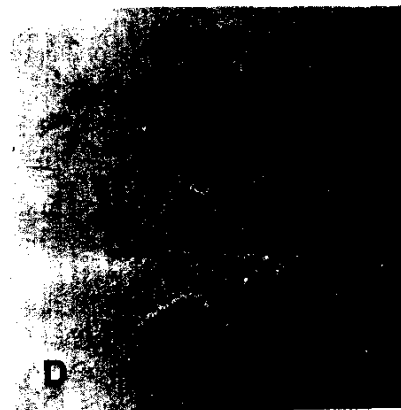
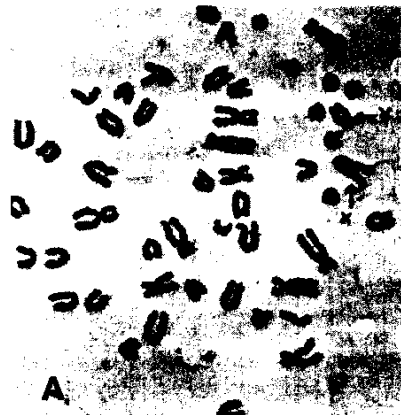
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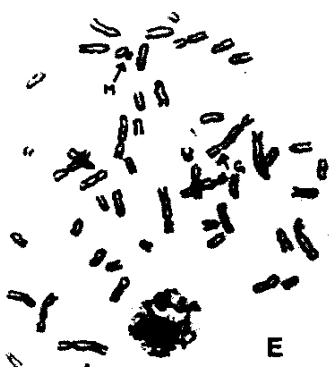
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**LEGEND TO THE FIGURES:**

- A: Geimsa stained normal metaphase chromosome (60,XY). Arrows indicate X and Y chromosomes.
- B: Geimsa stained metaphase chromosome (60,XY). Arrow indicates secondary constriction and 24q+.
- C: GTG banded metaphase chromosome (60,XY). Arrow indicates secondary constriction and 24q+.
- D: GTG banded chromosome (60,XY). Arrow indicates C band positive chromosome, q24+.
- E: Geimsa stained metaphase chromosome (60,XY). Arrows indicate minute chromosome (M) and chromatid gap (G).
- F: Geimsa stained partial metaphase chromosome. Arrows indicate chromatid gaps (G).
- G: Geimsa stained partial metaphase chromosome. Arrows indicate chromatid gap (G) and secondary constriction.
- H: Geimsa stained partial metaphase chromosome. Arrow indicates acentric chromosome.
- I: Eosin stained sperm plate shows abnormalities: kinked and coiled middle part and tail.
- J: Free sperm head.
- K: Free sperm tail.
- L: Proximal protoplasmic droplet.
- M: Distal protoplasmic droplets and bent middle part.
- N: Narrow head.





E



F



G



H



I



J



K



L



M



N

## CHLAMYDIOSIS IN BUFFALOES OF CAMPANIA, ITALY. (PRELIMINARY FINDINGS)

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### SUMMARY

Serological studies have been carried out to assess the prevalence of Chlamydial infection in buffaloes of Campania, Italy. Complement Fixation antibodies were detected by micromethod. The positive reactions were 328 out of 2779 (11,8%).

### KEY WORDS

Chlamydiosis, ~~buffaloes~~, Complement Fixation test, Italy.

### INTRODUCTION

Chlamydia psittaci infection is a worldwide common infection in domestic and wild animals; it is associated with different clinical features, but it causes above all respiratory and reproductive diseases; it is, also considered an "emerging zoonosis" (1).

In Italy, Chlamydia psittaci is a common pathogen of sheep and goats: enzootic abortion and perinatal mortality cause large economic losses; in cattle, Chlamydia psittaci can induce epizootic abortion, pneumonia, polyarthritits, keratoconjunctivitis, enteritis, encephalomyelitis, mastitis.

On the contrary, little is known about chlamydial infection in buffaloes. Chlamydiosis has been reported in buffaloes from Brazil at first in 1988 (5) and India (2, 3, 4, 7, 10, 11). Afterwards, experiments have been undertaken in India (6): buffalo calves experimentally inoculated intratracheally with Chlamydia psittaci cultures have developed pneumonia. In Italy, there are very few data: in 1995, Pugliese et al. reported data of a serological investigation among buffaloes with no symptoms in Sicily. 221 sera were tested by IFAT, and 28,05% were found positive (9). Therefore, Chlamydiosis probably exists in Italian buffaloes, too: Chlamydia psittaci is suspected to be cause of reproductive disorders, respiratory diseases, keratoconjunctivitis, etc.... We consider interesting to show our data, based on a serological investigation carried out in Campania.

### MATERIALS AND METHODS

120 herds, in which abortion, perinatal mortality and infertility have been pointed out, have been controlled; 2779 sera have been collected in 2090 female (75,2%) and 689 male

(24,8%) buffaloes submitted to the usual prophylaxis for Brucellosis, in the areas of Naples, Salerno and Caserta (Campania), during the year 1994.

The sera (stored at -20° C till investigation) have been examined by a Kolmer-type micromethod with Chlamydia psittaci commercial antigen (Behring). This antigen is a purified and inactivated suspension of Chlamydia psittaci (strain P4), obtained from the yolk sac membranes of infected chick embryos. Commercial positive control serum and sheep red cells (2%) have been used (8). Titre > = 1:16 is considered positive.

### RESULTS AND DISCUSSION

The positive reactions were 328 out of 2779 (11,8 %); the titres ranged from 1:16 to 1:512 (Table 1). The distribution of the titres is given in Table 2.

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**Table 1. Number of controlled buffaloes in three Campania provinces**

PROVINCE	NUMBER OF BUFFALOES	POSITIVE	POSITIVE%
<b>Naples</b>	<b>17</b>	<b>0</b>	<b>0</b>
<b>Caserta</b>	<b>925</b>	<b>71</b>	<b>7.67</b>
<b>Salerno</b>	<b>1837</b>	<b>257</b>	<b>13.9</b>
<b>TOTAL</b>	<b>2779</b>	<b>328</b>	<b>11.8</b>

**Table 2. Titre Frequency in 328 positive samples**

TITRES	FREQUENCY	%
<b>Titre 1 = 16</b>	<b>128</b>	<b>39</b>
<b>Titre 2 = 32</b>	<b>96</b>	<b>29.26</b>
<b>Titre 3 = 64</b>	<b>55</b>	<b>16.76</b>
<b>Titre 4 = 128</b>	<b>41</b>	<b>12.5</b>
<b>Titre 5 = 256</b>	<b>6</b>	<b>1.8</b>
<b>Titre 6 = 512</b>	<b>2</b>	<b>0.6</b>

The positive proportion is lower than in Sicily data (28,05%) (9): the difference is probably due partly to the size of the pool of sera (2779 against 221 ) and partly to the methods: IFAT is a very sensitive but subjective assay, whereas Complement Fixation is a very reliable test. Herds in which we have found positive animals were 82 out of 120 (68,3%), the size of the herds varied from 10 to 300 animals (Tables 3 and 4).

Correct epidemiological evaluations are not available for the time being. First of all, antibodies against Chlamydia psittaci can be yet demonstrated after several years. Therefore, paired sera should be checked to detect current infections: a titre increase of fourfold or more at an interval of about 14 days should be recorded to make a definitive diagnosis. In this first report, this evaluation was not possible. Moreover, a positive finding in the Complement Fixation test is not agent-specific. So, it is necessary to apply also the cultural assays in order to isolate and identify Chlamydia psittaci.

**CONCLUSIONS**

Further research is needed on buffalo Chlamydiosis in Italy: our investigations are going on in conjunction with isolation attempts. However, on the basis of these preliminary

findings (high positive proportion, high titres detected), we suggest that Chlamydial infection may be widespread among Italian buffaloes. It seems likely that perinatal mortality and some ocular and respiratory diseases of buffalo calves and some reproductive disorders of buffalo females (abortion and infertility) are associated with Chlamydia psittaci infection in Campania.

**ACKNOWLEDGEMENT**

We are grateful to Mr. A. Scaramuzzo, laboratory technician, for his contribution.

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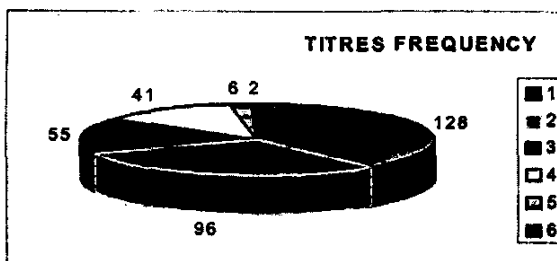
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**Table 3. Number of controlled herds in three Campania provinces**

PROVINCE	HERDS	POSITIVE HERDS	POSITIVE%
Naples	1	0	0
Caserta	10	9	90
Salerno	109	73	66.97
<b>TOTAL</b>	<b>120</b>	<b>82</b>	<b>68.33</b>

**Table 4. Herd size**

PROVINCE	HERDS	BUFFALOES
Naples	01	17
Caserta	10	64
		71
		65
		56
		29
		300
		150
		100
		48
		60
Salerno	109	10-150



## SOME NON GENETIC INFLUENCES ON TOTAL MILK YIELD IN IRAQI BUFFALOES

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### ABSTRACT

305 lactation records produced by 66 buffalo cows culled over 1967-1988 at the Misan Animal Breeding Station, south-east Iraq, were analysed by the least square method. The overall mean of total milk yield (TMY) was 1220 kg. TMY was highly significantly affected by parity, lactation period and breeding efficiency. The effects of origin of birth and month of calving lacked significance. TMY increased steadily till the 5<sup>th</sup> lactation. TMY was highest among cows with breeding efficiencies ranging between 71 and 80%; cows with higher or lower efficiencies produced less milk.

### KEY WORDS

Milk yield, breeding efficiency, Iraqi buffaloes.

### INTRODUCTION

Information on the various performances of the Iraqi buffaloes is very limited. This work describes the effects of some non-genetic factors on TMY of Iraqi buffaloes in the south-east region of the country. Such information are vital for economic assessment of buffalo herds and for the formulation of future breeding and management programmes.

### MATERIALS AND METHODS

305 lactation records produced by 66 Iraqi buffaloes culled over 1967-1988 at the Misan Animal Breeding Station, south-east Iraq, were analysed. TMY was studied together with the effects of parity, month of calving, origin of birth, lactation period and breeding efficiency (BE). BE was calculated according to Wilcox et al. as follows:

$$BE = \frac{[(\text{No. of parturitions} - 1) \times 365]}{\text{No. days from 1}^{\text{st}} \text{ to last parturition}}$$

Least square method was employed in the statistical analysis (Harvey W.R., 1987).

### RESULTS AND DISCUSSION

The overall mean of TMY was 1220 kg (Table 1). Milk yield was affected ( $p < 0.01$ ) by parity, lactation period and BE, whereas the effects of origin of birth and month of calving lacked significance (Table 2).

In previous reports on buffaloes in southern Iraq average lactation milk yield was higher

than the estimate obtained in the current investigation, it ranged between 1309 and 1463 kg (Juma K.H., 1997). In Iraqi buffaloes of Badosh, north of Iraq, however, average 305-day milk was reported as 2960.6 kg (Aljammas R.K.A., 1997).

In the present study, lactation yield of milk increased steadily from 915 kg during the 1<sup>st</sup> lactation to 1329 kg in the 5<sup>th</sup> lactation and decreased thereafter (Table 1). Whereas, Juma et al. (1992) who had also reported a highly significant effect of parity on milk yield of Iraqi buffaloes, added that maximum yield was obtained from the fourth lactation.

TMY increased ( $p < 0.01$ ) with increasing length of lactation (Tables 1 and 2). Maximum yield (1630 kg) was produced by lactations longer than 330 days. A similar relationship has been observed earlier by Juma et al. (1997) among Iraqi buffaloes where the regression of milk yield on lactation period was positive and highly significant.

Although the effect of calving month on TMY was not significant, the cows calving during April-June tended to produce more milk than those calving during other months (Tables 1 and 2). This can be attributed to the milder climate of the former period and the abundance of green fodder.

Origin of birth had no significant effect on milk yield (Tables 1 and 2). Whereas, in a previous report, this effect was significant and Niniveh- and Baghdad-born buffaloes surpassed those born in Misan or Thee-Qar in milk production

follows page 11 



IRAQI BUFFALO, SOUTH IRAQ



IRAQI BUFFALO, SOUTH IRAQ

due to differences in feeding and management practices to which heifers were subjected during their early stages of growth and development (Juma et al., 1997): an obvious consequence of the animal being close to the major milk consumption centres, namely Baghdad and Mosul (Niniveh).

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**Table 2 Analysis of variance for factors affecting total milk yield in Iraqi buffaloes**

Source of variation	d.f.	Mean square
Parity	7	603529.3 **
Month of calving	11	129621.9
Origin of birth	3	62533.7
Lactation classes	7	2977678.0 **
Breeding efficiency	4	414774.3
Residual	242	84613.3

\*\* P<0.01

**Table 1 - Least square means of factors affecting total milk yield in Iraqi buffaloes (kg).**

	No.	Mean	S.E.
Overall mean $\mu$	305	1220.0	+/- 56.0
<b>Parity</b>			
1	59	915.0	+/- 55.1
2	75	1124.1	+/- 53.5
3	59	1192.3	+/- 55.2
4	42	1298.7	+/- 58.7
5	34	1329.0	+/- 59.4
6	24	1297.6	+/- 64.5
7	7	1177.1	+/- 128.6
8	5	1301.2	+/- 137.2
<b>Month of calving</b>			
Jan	14	1170.4	+/- 95.9
Feb	12	1251.4	+/- 99.5
Mar	6	952.1	+/- 146.7
Apr	20	1308.0	+/- 83.7
May	23	1319.0	+/- 82.3
Jun	22	1333.9	+/- 82.0
Jul	27	1212.1	+/- 80.1
Aug	42	1151.2	+/- 71.2
Sept	50	1265.4	+/- 70.6
Oct	46	1173.0	+/- 62.5
Nov	27	1278.4	+/- 78.4
Dec	12	1224.8	+/- 90.7
<b>Origin of birth</b>			
Misan	242	1196.2	+/- 48.8
Niniveh	39	1178.2	+/- 64.6
Thee-Qar	12	1323.6	+/- 97.8
Baghdad	12	1182.0	+/- 103.7
<b>Lactation period, days</b>			
101-150	17	615.4	+/- 52.1
151-180	18	781.8	+/- 89.5
181-210	28	992.2	+/- 76.6
211-240	25	1254.1	+/- 67.1
241-270	68	1365.4	+/- 64.7
271-300	61	1515.2	+/- 62.3
301-330	29	1605.4	+/- 79.0
>330	92	1630.3	+/- 77.6
<b>Breeding efficiency %</b>			
51-60	51	1109.5	+/- 66.6
61-70	87	1275.4	+/- 60.0
71-80	92	1326.3	+/- 63.9
81-90	50	1153.6	+/- 70.0
91-100	25	1235.1	+/- 82.0

## DETERMINATION OF SOME FEATURAL AND PRODUCTION TRAITS ON IRAQI WATER BUFFALOES IN BADOSH

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Studies were conducted on the local breed of buffalo found in the Badosh district, province of Niniveh, north of Iraq with the aim to define featural and production characteristics as well as milk yield and components and correlations between the mentioned characteristics. Data were collected, with the aid of a questionnaire, from randomly selected private farmers of this area. In order to understand the breeding systems adopted by the producers in raising and managing their animals, data on the age distribution of buffaloes were collected. Measurements were also performed on the animals and two data analysis were done. The first analysis concentrated on the body weight, size and udder conformation, and the relationship between these traits. The second analysis involved special measurements in lactating buffaloes for the calculation of total lactation milk yield, with inclusion of the effect of the month on the weight of the new born calf and the effect of the season on milk production and quality, as well as the definition of formulas for predicting adult weight of dry and lactating buffaloes.

The results of the questionnaire showed that there are about 8,000 buffaloes in the Badosh area (6.15% of total buffaloes of Iraq) and that the average number of buffaloes per family is 29.56, of which 10.12 lactating buffaloes (i.e. 56.97% non-lactating and 43.3% lactating buffaloes).

Selection of bulls is done on the basis of featural and production traits of their dams and half sibs. Feeding systems in this area are quite primitive and do not take into account maintenance or production requirements.

Milking is done twice a day after calf suckling for allowing the let down of milk. The new born calves are left with their mother for one week after birth.

Our studies revealed that the majority of the buffaloes in this area are black, but few are grey or dark brown. White color with black spots occurs sometimes.

Buffaloes are exposed to various common diseases including internal and external parasites. They are treated with drugs only when these are available on the market.

Annual mortality per family is the following: 2.5 buffaloes below 1 year of age, 1.5 buffaloes at the age of 2 and 0.5 adult buffaloes, which means 10%, 6% and 2% per family respectively. The average weight of dry buffaloes was 556.88 kg. This weight was calculated on a random sample of 96 buffaloes. The maximum weight

was 636.77 kg in buffaloes over 8.5 years and the minimum was 457.75 kg in buffaloes of 3.0-4.5 years old. A significant effect of age on weight ( $p < 0.01$ ) was found.

On the same sample of 96 buffaloes the following average body measurements were taken:

chest girth: 211.05 cm  
belly girth: 254.13 cm  
diagonal body length: 161.43 cm  
depth of chest: 43.63 cm  
rump width: 62.51 cm  
height at withers: 143.18 cm  
height at rump: 140.42 cm.

Age had a significant effect on chest girth, diagonal body length, rump width ( $p < 0.01$ ) and on height at withers ( $p < 0.05$ ). Weight had a significant effect ( $p < 0.01$ ) on all measures. Teat measurements were performed on the same dry buffaloes (96).

Average length of the right front, left front, right rear and left rear teats were 6.32, 6.56, 7.38 and 7.91 respectively. Age had a significant effect ( $p < 0.01$ ) on the length of left rear teats only. On the contrary, weight had a significant effect ( $p < 0.05$ ) on right front and both rear teats.

Diameters of right and left front teats as well as right and left rear teats were 2.9, 3.6, 3.11, and 3.37 cm respectively. Age had a significant effect on the diameter ( $p < 0.01$ ) which is larger in older buffaloes.

Distance between front and rear teats was measured by impressing a cardboard under the udder after staining with ink the teat orifices. Distances between front teats is 14.16 cm, between rear teats 9.75 cm, between right teats 9.54 cm and between left teats 9.22 cm. Age and weight have a significant effect ( $p < 0.01$ ) on the distance between right front and rear teats (the older are the buffaloes, the shorter is the distance).

All measurements of body size were positively correlated with weight ( $p < 0.10$ ), this correlation was the highest with width of rump (0.67).

Correlation between body weight and teat length, teat diameter and the distance between them were positive and highly significant ( $p < 0.01$ ). The highest correlations with weight were those of the length of left front teat, right rear teat diameter and the distance between left front teats, which were 0.44, 0.29 and 0.34 cm respectively.

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The highest correlation coefficient among body measurements was found between height at withers and width of rump (0.90); correlation between diagonal body length and width of rump was 0.59; between chest girth as well as belly girth with width of rump it was 0.61; correlation between chest width and width of rump was also 0.61. All correlation coefficients were significant at  $p < 0.01$ .

The highest correlations found between body and teat measurements were the correlations of chest and belly girth with the length of left front teat: respectively 0.30 and 0.36. Significant correlations of length of right rear teat are found also with chest girth (0.26), belly girth (0.34), diagonal body length (0.32), depth of chest (0.19) and width of rump (0.33).

Correlation between length of front teat and length of right front teat is 0.79 ( $p < 0.10$ ).

The same measurements were performed on 25 randomly sampled lactating buffaloes.

At calving, measurements were:

weight: 573.68 kg

chest girth: 217.67 cm

belly girth: 248.36 cm

diagonal body length: 159.5 cm

depth of chest: 43.89 cm

rump width: 63.16 cm

height at withers: 142.92 cm

height at rump: 140.56 cm

Length of left front teat was 6.76 cm, left rear teat 8.58 cm, right front teat 6.78 cm and right rear teat 8.16 cm. Diameters of the same were 2.84, 3.32, 2.80 and 3.21 cm respectively.

Distances between front and rear teats were 13.95 and 10.24 cm respectively. The circumference of the udder was 92.52 cm while the depth of front and hind quarters was 21.82 and 29.88 cm.

Average weight of calf was 40.96 kg, 41.8 for males and 40.13 for females. No significant effect

was found for age of the mother and sex of calf. Average milk production in 305 days lactation was 2960.58 kg. Age had a significant effect on milk production ( $p < 0.05$ ); sex of calf had no significant effect. 305 days milk yield was calculated from milk records on weekly basis on two day milkings. It does not include either the suckled milk or the colostrum.

Average area of udder attachment to body was 690.36 cm<sup>2</sup>. No effect of mother's age or sex of calf was found on this trait.

Average weight of calf at the end of first, second, third sixth and eleventh month of age was 50.24, 63.92, 74.56, 105.71 and 169.67 kg. The highest daily milk yield was 13.63 kg at the fourth month of lactation, the lowest was 6.83 at the eleventh month. Average daily yield was 10.71 kg.

Milk had an average fat percentage of 7.34, protein percentage of 4.39, water 83.61, ash 0.63 and solid non fat (SNF) 9.06%. The effect of season on milk yield was significant ( $p < 0.05$ ). Maximum daily milk yield was in autumn (12.36 kg). Season had a significant effect on fat percentage and protein percentage: the highest in spring, the lowest in summer. No significant effect was found for the other milk components.

The following three prediction equation for adult body weight were obtained from the measurements:

1.  $Weight = -834.6 + 8.86 * body\ length;$
2.  $Weight = -1717.96 + 0.75 * chest\ girth + 6.52 * body\ length + 54.0 * height\ at\ withers - 47.27 * width\ of\ rump;$
3.  $Weight = -1817.82 + 2.5 * chest\ girth + 5.25 * body\ length + 40.04 * height\ at\ withers - 34.57 * width\ of\ rump + 37.91 * length\ of\ right\ front\ teat - 54.84 * length\ of\ left\ front\ teat + 16.91 * distance\ between\ front\ and\ rear\ right\ teat.$

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## DEMONSTRATION OF THE MONTHLY MILK RECORD IN AN ITALIAN BUFFALO HERD

B.Moioli, Istituto Sperimentale per la Zootecnia, Monterotondo (Italy)

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Animal recording is a prerequisite for any serious effort to develop livestock production at both farm and industry level. The main components of animal recording operation systems are:

1. Identification of the animal by applying a plastic eartag with a number which is readable from distance.
2. Collection of information on birth, age, reproduction, lactation, AI, pregnancy, calving.
3. Visit of a technician once a month and record of the traits (milk, body weight, milk sample for somatic cells or quality...).

4. Forward collected data to the data processing centre which produces feedbacks to farmers and central database.

5. Produce genetic evaluation .

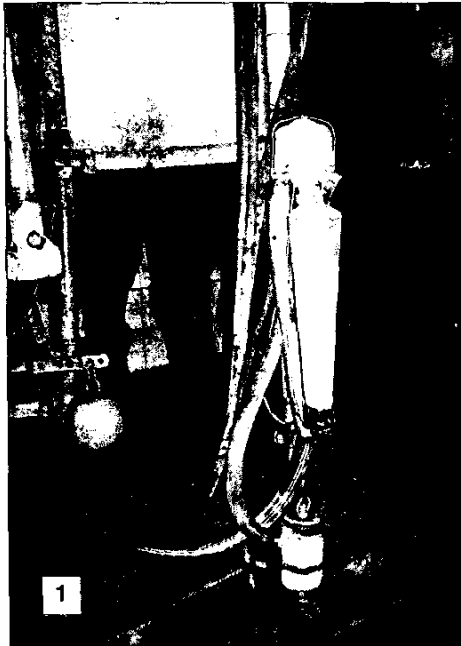
Organized animal recording has been practiced for long in many countries. However, attention was paid mainly to implement milk recording systems for cattle, often neglecting buffaloes. The International Committee for Animal Recording (ICAR) the non-governmental, non-profit organization concerned in the progressing of animal recording world-wide, has recently

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undertaken a programme to promote milk recording in buffalo by creating a Working Group on Buffalo Recording, with the purpose to harmonise recording systems in the different countries and to compare production data, selection purposes and breeding strategies in the various countries. The Buffalo Network is highly supporting ICAR in this activity. It is often believed that milk recording in buffalo is not feasible. We will present

here a photo demonstration of the running of the monthly milk recording in an Italian buffalo herd. The demonstration is performed at the herd of the Animal Production Research Institute of Rome, on 100 lactating buffaloes and a milking parlour made of 16 positions in two rows, shared with the Holstein cows.

Measurement of milk yield is done with the use of milk meters.

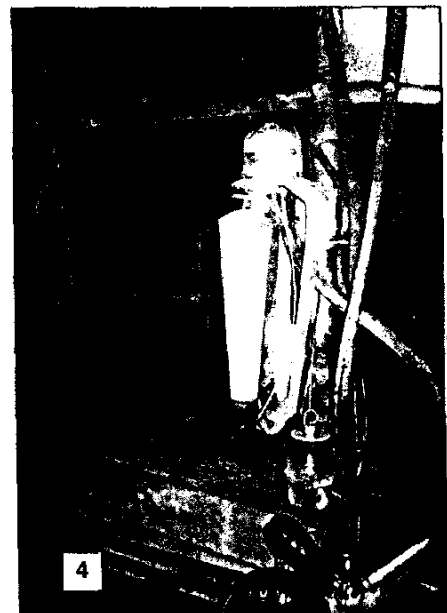


1) The milk meters are inserted in the milk pipe of the milking machine before the buffaloes enter the parlour, one for each milking position.

2) The technician writes on plastic tubes the number corresponding to each position in the milking parlour.

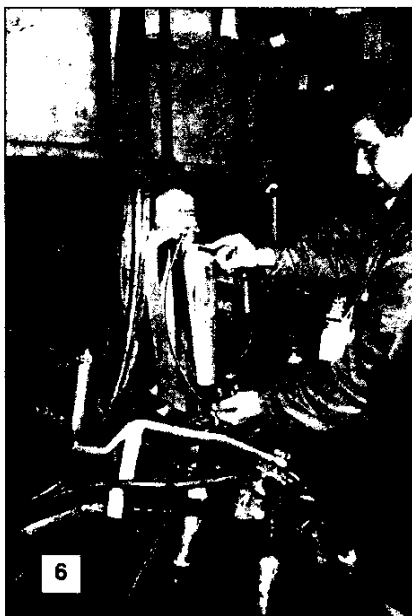
3) As soon as each buffalo enters the parlour, the technician writes the eartag number on a sheet in which the 16 positions in two rows are drawn. In this way association between eartag number and milking position is established. At the end of the milking operations, it will be easier and faster to write the amount of milk produced at each position, and therefore by the animal.

4) A quantity of milk proportional to total produced milk flows into the milk meter during milking.





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6) After mixing the milk.  
7) The technician takes out a milk sample for protein and fat determination.

5) As soon as one buffalo has finished to giving milk, the technician reads the measure on the milk meter and writes the amount besides the positional number and eartag number on the sheet of paper.

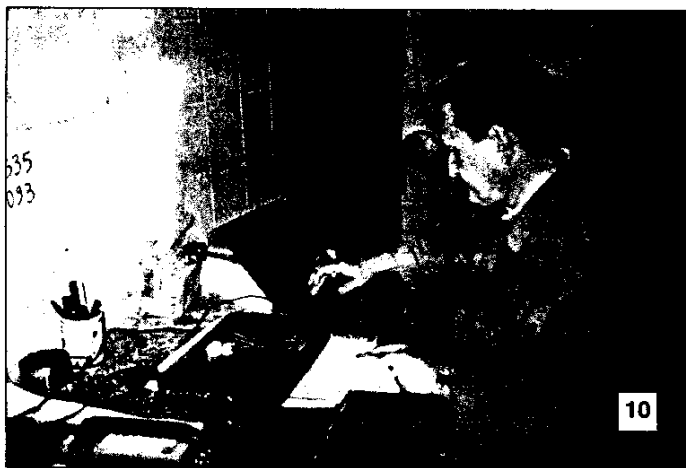


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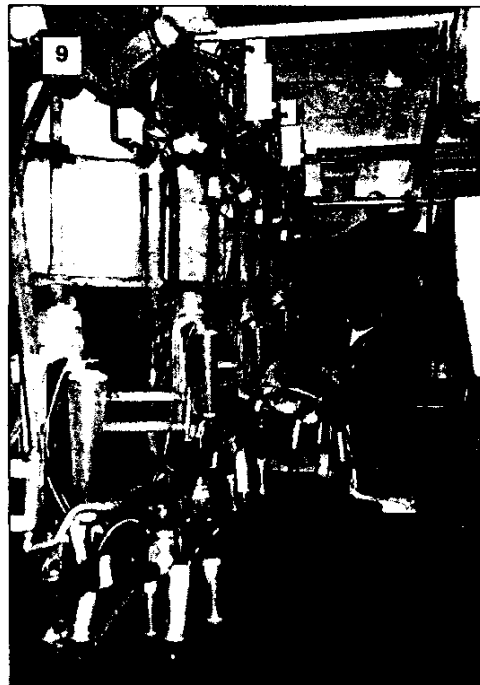
8) After each group of 16 buffaloes is milked, the tubes with the milk sample are put in the collecting rack.

9) When the milking of one group of 16 buffaloes is over, a new group will go in.

10) At the end of the milking, the technician inputs all measurements of the amount of produced milk into a portable computer. Analysis of milk content will be performed by the official laboratory.



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**buffalo news - buffalo news - buffalo news - buffalo news - buffalo news - buffalo news**

**The International Committee for Animal Recording (ICAR)** is a non-governmental, non-profit organization concerned in the progressing of animal recording world-wide. The aims of ICAR are to promote improvement of farm animal recording and evaluation through the formulation of definitions and standards for the measurement of traits of economic importance. Every second year ICAR holds a General Assembly where results of the work of its Sub-Committees, Working Groups and Task Forces are presented. The 32nd ICAR Conference will be held from 16th to 19th May, 2000 in Slovenia. During this conference, a Joint FAO-ICAR Buffalo Workshop will be held on May 17th, on "Animal Recording for Improved Breeding and Management Strategies of Buffaloes". During this workshop, the major problems concerning the exploitation of recording data and the breeding practices will be depicted and analysed. INTERBULL (International Bull Evaluation Service) experts will participate in the session and draft recommendations. If interested, do please contact the Coordination Centre of the Network or directly ICAR at <j.bo Yazoglu@rmnet.it>.

**A Working Group on Buffalo Milk Recording** was officially constituted in the International Committee for Animal Recording (ICAR). The first action of the group will consist in producing and publishing statistics on buffalo productivity in the countries where buffaloes are milk recorded. The following

parameters will be considered: breeds, number of recorded buffaloes, lactation duration, lactation yield, fat and protein %, calving interval, number of AI, etc. We invite the people and Institutions of each country who might provide such data to contact the Coordination Centre of the Network.

**The Eight Session of the Commission on Genetic Resources for Food and Agriculture met in FAO - Rome, Italy from 19-23 April 1999.** The Commission welcomed the report of the First Session of its Intergovernmental Technical Working Group on Animal Genetic Resources that met from 8 to 10 September 1998 to further develop the Global Strategy for the Management of Farm Animal Genetic Resources. The final report of this session, at point 9, says: "the Commission noted that animal genetic resources are of crucial importance in the sustainable utilization of many production systems and are essential components in achieving global food security and rural development". At point 13 the report says: "the Commission requested the Secretariat to collect existing information on capacity building projects and networks, at the regional and country level and to utilize the networks for future activities on animal genetic resources". The coordination centre of the Buffalo network appreciated the mention of the important role that FAO networks play in the management of animal genetic resources.

### **Buffalo Newsletter**

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Number 12 - June 1999

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Printed by: ANIS EDITRICE  
via Val di Fiamme 16/20  
Roma - Telef. 06/8180396

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