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INCLUDES SHORT COMMUNICATIONS, RESEARCH PAPERS, TECHNICAL NOTES, ONGOING RESEARCHES

From the editor

There are several news in the field of buffalo that need to be referred: congresses, ongoing projects, technical activities and development processes. It is important therefore that the Buffalo Newsletter circulates such news all over the world, and all readers are invited to send to us any news, scientifical and technical notes and reports on buffalo matters.

We are going to list here the upcoming congresses:

- the 1st Buffalo symposium of the Americas will be held on 1-8 September, 2002, at Belém, Parà, Brazil, organized by Roberto Fonseca (President), William G: Vale (Scientific Secretary), Eduardo Dahez (General Secretary);
- the European Association for Animal Production

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ANNUAL TREND OF THE TESTOSTERONE BLOOD CONCENTRATION IN BUFFALO BULLS OF DIFFERENT AGES AND REPRODUCTIVE MANAGEMENT

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KEYWORDS

Buffalo male, testosterone, seasonality.

INTRODUCTION

The most important problem for buffalo production and marketing in Italy is seasonality of reproduction, with partial anestrus or even deep anestrus during spring – summer time *(Borghese et al., 1996)*.
Seasonality depends obviously on many factors, both genetic and environmental, mainly nutrition. Melatonin plays in buffalo, as well as in other livestock, a fundamental role in giving start to hypothalamus-pituitary-ovarian axis activity *(Borghese et al, 1994)* with variations in level between 3 and 10 pg/ml in day time and between 20 and 90 pg/ml at night time, while levels depend upon day-light hours, and therefore season, as well as upon the age of the buffalo.
As regards to melatonin, also a high individual effect was evident, therefore a genetic component is supposed, with animals in which melatonin levels are more constant – therefore less seasonal compared to those which are strongly seasonal *(Borghese et al., 1994)*.
In Italy the goal of having as many buffaloes as possible to calve before spring is of primary importance because the demand for buffalo milk is especially high in spring-summer, with variation in milk price between winter and summer of 50%.
This goal could be realized by estrus induction applying progesterone releasing intravaginal device (PRID) and other hormons *(Barile et al., 1997, 1999, 2001; Pacelli et al., 2001)*.
While endocrine activity was much studied in females *(Borghese et al., 1996)*, it is less known in males.
The present work was carried out to verify the seasonality of the testosterone production (by the testosterone haematic concentration) in the buffalo bulls bred in central Italy.

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is organizing the 53th Annual Meeting from 31 August to 4 September, 2002, in Cairo, with a session dedicated to buffalo production;

- the following year, EAAP will organize the 54th Annual Meeting from 29 August to 3 September, 2003, in Rome; during this meeting, a Satellite Symposium on the Recent Progress in Buffalo Reproduction will take place, organized by the coordinator of the Buffalo Network;
- the 4th Asian Buffalo Congress will be held in New Delhi on February 25-28, 2003: for further details about this event, contact prof. O.P. Dhanda, College of Agriculture and Animal Sciences, CCS Haryana Agricultural University, Hisar 125 004, India, fax +911662 34952, e-mail abc@hau.nic.in;
- at last, the 7th World Buffalo Congress, organised by Libertado C. Cruz, the new President of the International Buffalo Federation, will be held in the Philippines in 2004.

As everybody can see, there are lots of activities to follow up, and occasions to meet colleagues and scientists to compare research progresses and results.

As regards to the projects, the Buffalo Network started trials of estrus induction and artificial insemination with semen of Italian proven bulls, with the aim of progeny testing, in Ilikpinar village in Antakya district of Turkey, with the cooperation of prof. Ozel Sekerden (Mustafa Kemal University). A similar project is planned to be extended to Azerbaijan, with the cooperation of the local Ministry of Agriculture and the support of the FAO- ESCORENA.

We think that simple and low cost technical actions might improve welfare in developing countries and we hope that further activities will be spread out in many other countries.

Antonio Borghese

from page 1/ **ANNUAL TREND OF THE TESTOSTERONE BLOOD CONCENTRATION IN BUFFALO BULLS OF DIFFERENT AGES AND REPRODUCTIVE MANAGEMENT**

MATERIALS AND METHODS

This study was carried out on 27 buffalo entire males of 8 different farms. The animals were kept in different management conditions: in three farms the bulls were kept with the females all the year and therefore could display mating activity all the year long, (group A; n=8 adults, mean age 43.4 ±15.6 months), while in the other farms the males were separated from the femals in the period October-February (group B; n=13 adults, mean age 53.6± 19.0 months).

Once a month, from September to August, blood samples were collected from the jugular vein in all the animals in order to determine Testosterone (T) level.

RESULTS AND DISCUSSION

Table 1 shows the highest testosterone blood levels in spring-summer, while the autumn and winter mean values are significantly lower considering all the animals or particularly the group B ones. In the group A there is the same trend but the differences are lower and without significance.

This annual trend is somewhat unexpected, being temporally discordant with the short days reproductive season normally displayed by buffaloes. In our opinion, the spring T rise is probably due to the reproductive mating activity to which the adult bulls were submitted in all the examined farms: in this period, the males of the B farms were joined with the females after 5 months of separation, it could explain the lower difference in A group between spring –summer and autumn-winter periods in comparison with B group.

However the found testosterone trend, the high endocrine gonadal activity in spring, the lack of a consistent hormonal peak in autumn, suggest that in buffalo males (unlike females) the control of the androgenic activity is more influenced by behavioural interactions with females than by decreasing photoperiod and melatonin activity.

So, the out of season mating could be applied without problems.

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Table 1 – Testosteronee mean levels (ng/ml± s.d.) in buffalo bulls during the different seasons.

Period	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Group A	2.11±1.42	1.91±1.21	1.41±1.44	1.34±1.29
Group B	1.93±1.65Aa	1.90±1.63Aa	0.90±0.66b	0,78±0,70B
All animals	2.01±1.53A	1.90±1.44A	1.12±1.08B	1.04±1.05B

Group A bulls were kept all the year with females. Group B were separeted from females between October and February.
Different superscripts indicate mean differences on the line (small case P<0.05, capital case P<0.01)

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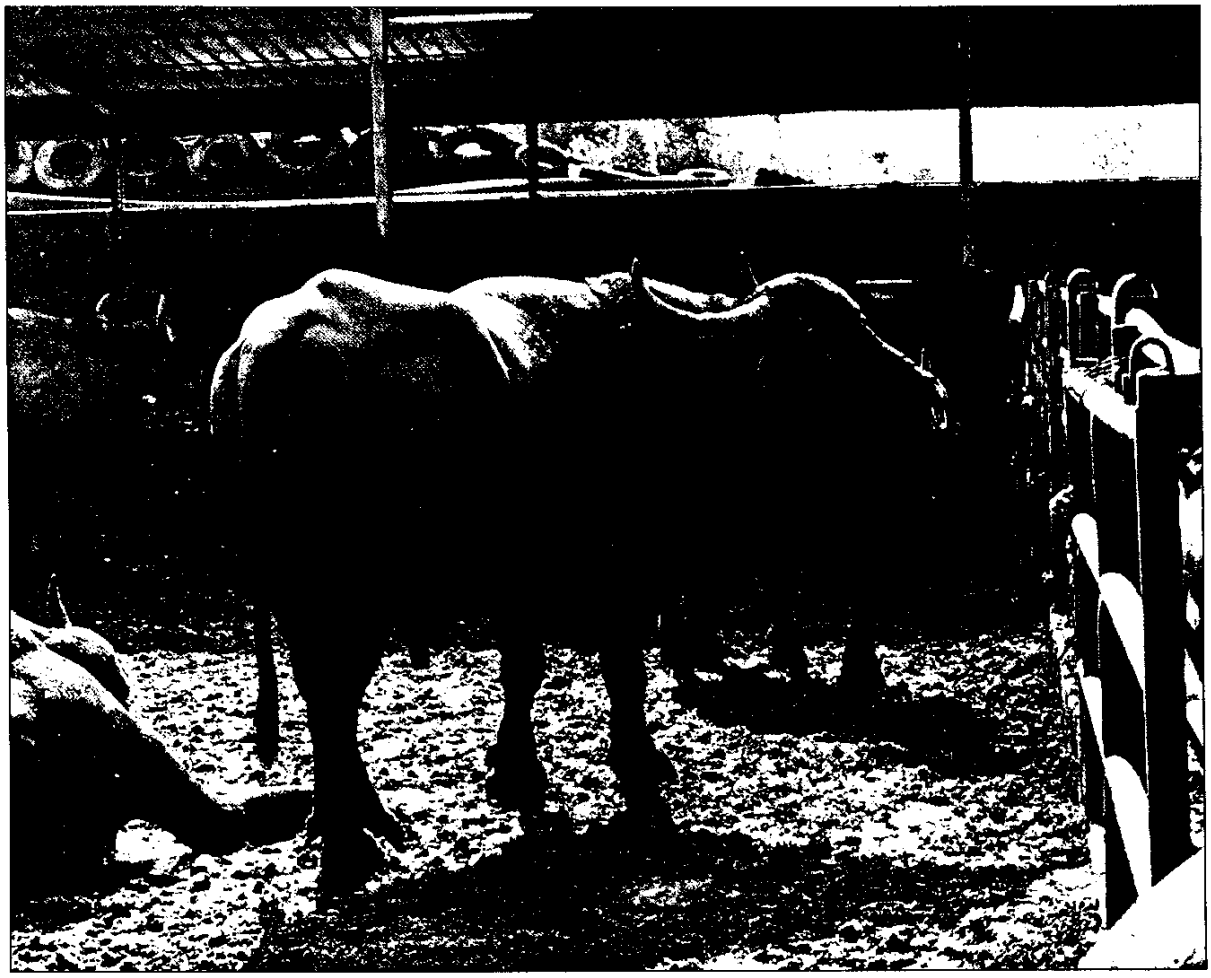

Buffalo bull - Tor Mancina farm (Monterotondo, Italy).

COMPARATIVE STUDY OF SOME PHYSIC-CHEMICAL COMPONENTS OF BOVINE AND BUFFALO MEAT (BRISKET CUT) DURING THE TRANSFORMATION PROCESS FROM MUSCLE TO MEAT

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ABSTRACT

The objective of this work is to compare the physic-chemical behavior of bovine and buffalo meat (cut:loin) during the process of transformation from muscle to meat. The compared variables were pH, acidity, humidity, ashes and protein. The comparative statistical study was done by a variable analysis for both kinds of meat in a completely aleatory design, with factorial adjustment 2x4; two kinds of meat: bovine and buffalo; and four times of process; time 1 (0-1 day), time 2 (3-4 days), time 3 (5-7 days) and time 4 (9-12 days). The results showed that pH, ashes and protein variables behave the same way in both kinds of meat (there is no significant difference) during the process of transformation from muscle to meat. Significant changes were found for the acidity variable between the two kinds of meat. Being bovine meat more acid than buffalo during the process of maturation. Significant differences were also found in the humidity variable where buffalo meat has a greater percentage of humdity than the bovine meat. It is suggested to continue with this type of research where other variables like carbohydrates, lipids and vitamins are included and thus, comparisons can be obtained from a nutritional point of view.

KEYWORDS

Meat, maturation, bovine, buffalo.

INTODUCTION

Meat is a muscle tissue, which undergoes physic-chemical changes after the animal's death; that is to say, the muscle suffers a transformation or a maturation process generating certain characteristics, which improve the meat quality at both the organoleptic and nutritional levels.
In Colombia, bovine meat is the one that is traditionally consumed. However, this represents high costs in the market, which prevents people of low income to consume it. That is why it is necessary to search and experiment new species that efficiently adapt and produce in our environment, as is the case of buffalo meat which represents a better product in comparison to bovine meat: it would be a less expensive alternative of high quality to favor the low income class.
In accordance, a comparative physic-chemical study between bovine and buffalo meat during the maturing process was carried out. It is based upon the results of two different investigations carried out at the Institute of Agro-Alimentary Quality Management "INGECAL", Sánchez & Toro (8) and León & Marín (5), so as to analyze the physic-chemical behavior at different times (in both types of meat) and to establish optimal consumption points for each of them as well as the differences between them. Finally, recommendations are given in relation to the best use of these products, either at the industrial level or as an alternative to the alimentary problem of low income class people.

MATERIALS AND METHODS

In this study bovine and buffalo meat was used (Brisket cut) under refrigerating conditions (0-4 centigrade) during the maturation process that is, in the transformation from muscle to meat. To reach the proposed objectives, this research was divided into two phases:

Phase I. Data collection
This phase consisted in the collection of a data base pertaining to the results of two research projects about nutritional and physic-chemical analysis of Bovine and Buffalo meat during the maturing process, Sánchez y Toro (8) and León Marín (5).

Phase II. Physic-Chemical Comparison of Bovine and Buffalo meat (Brisket cut).
Once the data were obtained, the comparative analysis of some components of both types of meat during the maturing process was established, with the purpose of determining the physic-chemical changes of both types of meat

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during the transformation from muscle to meat under refrigerating conditions (0-4 centigrade). During the maturation process of the meat (bovine and buffalo) under refrigerating conditions, the following characteristics were determined as variable responses: pH or Ionic acidity, acidity expressed in mEq/g of lactic acid, humidity, protein and ash, Normas ICONTEC (3).

Experimental Design. During the maturing process under refrigerating conditions (0-4 centigrade) in total 4 treatments were constituted for each species and were distributed in an aleatory design, with factorial arrangement of 2x4; two types of meat: Bovine and Buffalo; and 4 processing times: Time 1 (0-1), 2 (3-4), 3 (5-7), and 4 (9-12 days) The experimental unit was constituted by 500 grs of meat and 5 repetitions for each treatment.

Statistical Analysis. Average of response variables for each type of meat were calculated and one variable analysis "ANOVA" for each type of meat and processing times, under the experimental design proposed with the response variables.

RESULTS AND DISCUSSION

Analysis of Bovine meat results. Table 1, presents the averages of the values for each of the characteristics evaluated in Bovine meat (Brisket cut) during the transformation of muscle to meat under refrigerating conditions (0-4 centigrade).
As observed in Table 1, the pH has initially an acid behavior which increases as time increases. However, within the 9 and 12 days of storage the pH decreases to a value near time 1, that is to say, in the first day of storage under refrigeration, the pH presented in Time 1 and 2 matches with the results reported by Belitz y Grosch (1), who mention that the pH values in the first maturing are between 6.5 and 6.8 proving that probably the animals were under stress or tired, causing a low concentration of glycogen. For time 3 an increase in the pH is observed to 6.13 which could have been caused by a true rigor-mortis because this process takes more time when the meat is kept under low temperatures, as cited by Fennema (2); finally, in time 4 a decline is observed with a value of 5.84 influenced by the absence of ATP, glycogen and storage temperature being similar to what cited Belitz y Grosch (1), and by Price and Schweigert (7).
Acidity is incremented with maturation, (Table 1) where we can observe that the results of time 1 and 2 match with López de Torre and Carballo (6), whose report says that when oxygen has disappeared, then lactic acid replaces it. With time, this tends to increase due to glycolic activity. After that, between times 3 and 4 acidity decreases which can be due to the storage conditions (temperature) or for the departure of lactate and the protons to blood circulation before or after death generating a meat with darkfirm-dry (dfd) characteristics as Price and Schweigert stated (1994).
In humidity, the meat does not vary much with the maturing time since the loss is not very high. The average values are between 68.10% and 66.86%, values that match with Price and Schweigert (7), who propose that the humidity of meat under refrigerating process is between 69 and 71%, that is to say, where loss is no more than 2% as in the previous case.
The protein percentage decreases between 5 and 7 days of maturation which can be caused by the fragmentation of the product and the presence of more proportion of adipose tissue since with more fat concentration, there is less concentration of protein, as shown in the SOUCI-FACHMANN-KRAUT food tables (1962) cited by López de Torre and Carballo (6).
Regarding ash in Table 1, a minimum variation of the product is observed from time 1 (1-04) to time 4 (1.0) since the total concentrations present in the muscle as potassium, sodium, magnesium, calcium, iron, zinc, phosphorus among others, under refrigerating processes do not suffer any alteration. The values found match with the literature found by Price and Schweigert (7), which indicates the values between 0.8% and 1.2%.

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Table 1. Average results of the physic-chemical variables of Bovine meat.

"Bovine meat"	Ph	Acidity (mEq/g Lactic acid)	Humidity %	Ash %	protein %
Time 1 (0-1 days)	5.76	0.22	68.10	1.04	19.42
Time 2 (3-4 days)	5.87	0.25	64.62	1.13	20.20
Time 3 (5-7 days)	6.13	0.10	64.83	0.87	17.50
Time 4 (9-12 days)	5.84	0.13	66.86	1.00	18.70

Analysis of Buffalo results. Table 2 shows the average of the values for each of the characteristics evaluated in the Buffalo meat (Brisket cut) during the transformation of muscle to meat under refrigerating conditions (0-4 centigrades).

The initial pH of Buffalo meat is 5.78 as cited by Price and Schweigert (7), stating that the pH of animals recently sacrified is 6.8 because at the moment of the analysis, the muscle had 10 hours of post-mortem. The results were much lower since after several hours, the rigor starts making these values normal. From time 2 to time 4 there is a progressive ascent of pH; nevertheless it is reduced in time 3. This is related to what was stated by Lawrie (4), who mentions that this effect may be caused by the increase of osmotic pressure because of the protein degradation to small molecules.

According to Table 2, the acidity in the first day of storage was 0.48 mEg/g lactic acid which might have been caused by the time that had passed since the moment the animal died and the moment of the analysis. Thus, this is related to what was stated by Price and Schweigert (7). After the animal dies, glycogen becomes the main source of energy for the glycolic which consequently has an accumulation of lactic acid. From time 2 to 4 it tends to be reduced though there is not much difference which is in agreement with what was described by Price and Schweigert (7); regarding the degradation of glycogen it is not developed at the same speed in all the stages following death. Nevertheless, when the muscle has the property of contracting, glycolic continues at a minor speed until all glycogen is over or the pH sufficiently reduces as to completely inhibit the glycolic enzymes.

As for humidity, Table 2 shows that the average values are between 74.75% and 75.91%. This can be related to what was mentioned by Lawrie (4), who said that the meat approximately contains 75% of water. Buffalo meat does not lose much humidity with time.

Table 2 shows that the average values of protein in time 1 (15.28%) is less that in times 2,3, and 4. As Lawrie (4) says, meat becomes milder and tastier when it is kept fresh at a superior temperature to the freezing point. Besides, it is evident that as there is a progressive increase in the quantity of proteins, it is related to a high microbic activity because the consequent degradation of the meat proteins and the accumulation of diverse metabolites of the glycolic process make the muscle richer. Finally, the percentage of ash at the different maturing processing times, tends to decrease, though the difference is minimum. This is confirmed by Fennema (2), who indicates that the concentration of minerals presented in the meat muscle under refrigerating temperatures does not alter.

Comparative study for both types of meat (Bovine and Buffalo) with the variables of response. This comparative study was made by means of an analysis of variety with a significant level of 95%.

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Table 2. Average results of the physic-chemical variables of Buffalo meat.

"Buffalo meat"	Ph	Acidity (mEq/g Lactic acid)	Humidity %	Ash %	Protein %
Time 1 (0-1 days)	5.78	0.48	74.77	1.23	15.28
Time 2 (3-4 days)	5.77	0.39	74.64	1.05	23.02
Time 3 (5-7 days)	5.73	0.37	74.91	1.05	25.50
Time 4 (9-12 days)	6.33	0.35	74.57	1.07	24.90

Table 3. Comparison of average values of Buffalo and Bovine meat.

Variable	Buffalo meat	Bovine meat	Anova
pH	5.90	5.90	NS
Acidity (mEq/g lactic acid	0.39	0.17	SS
Humidity (%)	74.97	66.10	SS
Protein (%)	22.10	18.90	NS
Ash (%)	1.10	1.01	NS

Table 3 shows that there was no statistically significant difference in pH in any types of meat with respect to time.
Regarding acidity between the two types of meat, there was a significant statistical difference, being bovine meat more acid than buffalo. However, with the time of maturation, there was no statistical significant difference. These results agree with Vargas (9), who mentions that acidity and its changes in meat are produced by the relative glycolic quantities present in the muscle and transformed into lactic acid.
Regarding humidity between the two types of meat, there was a statistically meaningful difference, being buffalo meat the one that maintains more humidity percentage, than does bovine. However, with maturing time, there was no significant statistical difference. The results were similar to what was found in the literature, cited by Vargas (9), who mentions that the higher the pH level in the muscle, the more united is the water to the muscle proteins. As above mentioned, buffalo meat is less acid (higher pH) than bovine meat which makes it more humid.
Table 2 shows that buffalo meat has more percentage of protein which can be related to higher capacity of water retention, since, as López de Torre and Carballo (6) cited, when there is more protein (Miosin) there is more capacity of humidity absorption.
These results prove that the buffalo meat, when having high humidity, has the characteristic of being more tasteful and so represents an advantage taste for consumers.
The optimal consumption point of each kind of meat was chosen, having, as criteria, the higher percentage of protein presented during the different times of the maturing process. For buffalo meat time 3 is chosen (5-7 days) where the higher percentages of humidity is found also, which would make it more juicy in comparison to bovine meat.
Due to the differences found in buffalo in comparison to bovine meat with respect to acidity and humidity, it is concluded that the organoleptic characteristics of buffalo meat change, as stated by Vargas (9), in high pH (less acid) during the conversion from muscle to meat, a very black color is presented and water is strongly united to the muscle proteins (increment in humidity percentage).
Regarding the protein variable in both types of meat, there was not a statistical significant difference with respect to maturation time. However, as observed in Table 3, buffalo meat has an average protein value of 22.1, that is to say 3.2% higher than bovine meat. With respect to maturing time, bovine meat presents the higher percentage of protein (20.2%) between the third and fourth day (time 2) of maturation, recommending this time as the optimal for its consumption, though the values shown during the maturation process were fluctuant. This means that this type of meat requires other type of handling conditions and of refrigeration. On the other hand, buffalo meat showed an ascending behavior in the percentage of protein during the maturation process, reaching a higher percentage of 25.5% between day 6 and 7 (time 3) of storage whose time is suggested as the optimal point of consumption.
For the variable ash, no statistically significant difference was found between the two types of meat with respect to time, as shown in Table 3.

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THE ASSAY OF THE PREGNANCY ASSOCIATED PROTEINS (PAG – PSPB) IN CIRCULATING BLOOD AS A PRATICAL AND CONFIABLE PREGNANCY TEST IN BUFFALO

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KEYWORDS

Buffalo, PAG, PSPB, Pregnancy diagnosis.

The request of a practical and confiable method for pregnancy diagnosis is increasing in modern buffalo breeding but is, till now, an unresolved problem. In fact, only by rectal palpation or by echografic examination the presence of the embryos may be conclusively ascertained, but such controls are not systematically carried out in most farms, due to the trouble of separating and restraining the animals and to the cost of the specialistic professional service.
In the bovine and other species, the first and simplest sign of pregnancy is the non return in oestrus. In buffalo, due to the weak behavioural manifestations of oestrus and the high incidence of silent heats this sign is uncertain. Even in the presence of entire or deferentectomized males the coupling behaviour may be misleading, because it can be frequently observed also in occasion of anovulatory oestruses, and on the other hand a certain incidence of anomalous couplings on pregnant females can be observed. Therefore the plasma or milk progesterone assay by RIA or EIA at the 21th day after the coupling or the A.I. is not confiable, because it is requiring an exact knowledge of the fertile oestrus date, which is unrealisable in the most common reproduction practice (males present in the herd for longs periods of the year).
Furthermore, even in the case of synchronised oestruses by hormone treatments for artificial insemination purposes, this method is giving a high incidence of false positive results in buffalo, due to the high frequency of long (and short) cycles, especially at the beginning and at the end of the reproductive season, or determined by other causes such as climatic stress or uterine infections *(Campanile et al., 1993)*. An unknown, but probably high frequency of embryo losses occurring at various stages of pregnancy may also concur to increase the frequency of false positive results in this species, where even later pregnancy interruptions may pass unperceived. Diagnosis based on serial assays of P4 or/and oestrogens blood levels are scarcely proposable in practice.
A pregnancy test founded on the detection of pregnancy specific proteins (PAGs – PSPB) has been developed and is more and more largely used in the bovines and in other domestic ruminants *(Humblot, 1992; Beckers, 1999)*. The presence of these proteins is linked to the gestational status and they are detectable in maternal blood from nidation till birth.
The pregnancy associated glycoproteins (PAG) synthesized by trophoblast binucleate cells, have been isolated in several ruminant species. They are released in the maternal blood and are supposed to exert an immunomodulatory role besides antiluteolytic and luteotrophic action. Such proteins have been documented in many domestic and wild ruminant species. From the bovine placenta a 67 kD glycoprotein, named PAG I 67, has been purified *(Zoli et al, 1991)* which is corresponding to the better known PSPB (Pregnancy Specific Protein B), the first to be isolated *(Butler et al., 1982)* and utilised for pregnancy test. In France and Belgium this pregnancy test is now very commonly used.
The assay of the PSPB is routinely carried out in the UNCEIA laboratory (Maisons Alfort, France) where 40.000 tests per year are performed. PAGs are assayed in the laboratory of Veterinary Physiology of Reproduction of Liege (Belgium), in this case 60.000 pregnancy tests are performed each year, as an optional supplementary test on the same blood samples taken for routine sanitary controls.
By means of the same RIA methods utilised for bovine and others species, we could detect antigens analogous to the PAGs-PSPB in the blood of pregnant buffaloes *(Debenedetti et al., 1997; Debenedetti et al., 2001)*. By successive works, we could demonstrate that significant levels of PAGs-PSPB are surely detectable from the 30th day of pregnancy till birth.
Successively, the PAGs concentrations decrease slowly, and become negligible 50 day after birth *(Malfatti et al., 2001)*.
From our trials (near 1.000 assays carried out on buffalo cows of different farms, in different seasons and different management conditions) the PSPB become detectable in 33% of the pregnant females between the 20th-25th day after fertilisation (fig. 1), on the 30th day it results measurable in all animals (1.6 ± 1.1 ng/ml) and on the 35th day, 91% of the animals have PSPB blood level >1.0 ng/ml. Successively the PSPB concentration increases rapidly, reaching 6.6 ± 3.2

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ng/ml on the 50th day and maintaining similar values till the end of pregnancy (fig. 2). By fixing a prudential positive threshold value of 1 ng/ml, the percentage of negative results on pregnant animals is lower than 5% in the assays performed in buffalo cows sampled from the 35th day of pregnancy until birth.
Pregnancy failures and stillbirths determine a decrease of the PSPB blood levels analogous to that occurring after birth.
From our data, it appears that the PAGs-PSPB assays are utilizable as reliable pregnancy test. In most buffalo breeding, the blood sampling is easily performed. Samples taken for other purposes are utilisable: plasmas or sera can be indifferently used, the PAGs- PSPB are relatively stable, and their assay may be delayed for 24-48 hours later, or can be performed on samples kept by freezing.
At present the main obstacle to the diffusion of this method is the necessity to have recourse to specialised RIA laboratories In order to overcome this obstacle, an active research is in progress to set up EIA kits utilisable in all laboratories. Furthermore, we are working to isolate and purify the specific buffalo PAGs, in order to obtain more efficient and specific antibodies.

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Figure 1. Blood concentrations of progesterone (P4) and PSB in one buffalo cow before and at the start of pregnancy

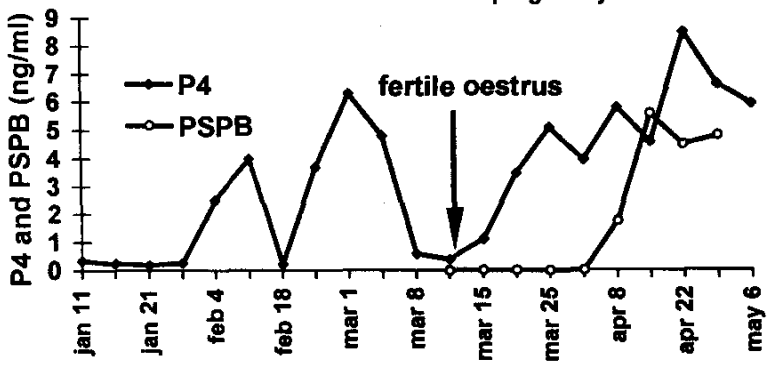
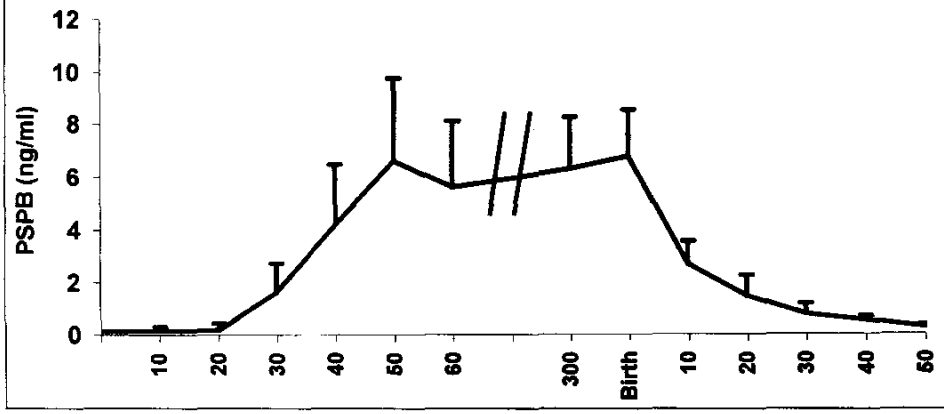


Figure 2. PSB concentrations during pregnancy and post-partum in buffalo cows



PROFILE OF WATER BUFFALO AND VETERINARIANS IN PAKISTAN

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Pakistan is a developing country. The major source of milk production is the Water Buffalo Bubalus bubalis Riverian types. Two major breeds of buffalo found in Pakistan are Kandhi and Nili Ravi.

More than eighty percent of the buffalo herds are raised in small numbers and seldom exceed 30. In rural areas, it is common to see buffalo in small groups of five or less. Exact statistics of buffalo numbers cannot truly be found since these animals are not registered.

The understanding of keeping buffalo by the majority of buffalo owners is limited. They understand that buffalo can provide milk by grazing on riverbanks, roadsides, open grass fields and straws; however, they don't understand that investing in proper nutrition and management systems can enhance the productivity of milk yield. It is partly true that buffalo are resistant to several diseases, for example tick born diseases and displacement of abomaism. Yet scientifically, such arguments have to be proven. Understanding of preventative medication among buffalo owners is very minimal. The relationship between buffalo owners and veterinarians barely exist. Such ignorance from the owners has caused devastating economical losses both to the country and to themselves. Owners expect veterinarians to provide a one-visit remedy to cure their animals and do not understand the belief in diagnostic procedures when justified. Most of the owners will practice their home remedy first and then seek help from veterinary compounders, assistants or technicians. When all else fails, they will go to the veterinary hospitals. Most of the hospitals and clinics have limited drug supplies and negligible amounts of surgical diagnostic tools on hand. Some of the clinics and hospitals are in dire need of medical supplies and upgrading.

Veterinary extension methods are taught in veterinary schools. These methods allow understanding and communication between farmers and research. Such ideas and impressions are brought from European and American systems, but do not always apply to the implementation of the methods of farming in Pakistan.

Veterinarians should take immediate steps and reach out to buffalo owners, farmers and the buffalo industry and start extension work at their grassroots. Veterinarians living in the community should approach buffalo owners and farmers and inform them how they can protect, control and increase the output of animals. They should develop a relationship with buffalo owners and farmers and inform them what services they can provide and their availability. Once these relationships are developed, farmers and owners and the country can prosper.

Pakistan is importing buffalo semen, which does not go through any thorough disease investigation. Imported semen has had some negative impact on some animals. The author of this report had traced and linked bovine viral diarrhea (BVD) after the introduction of semen to a group of buffalo. Perhaps the imported semen was contaminated with BVD. The methods of diagnosis of BVD were based on the history, physical exam findings, and most of all, characteristics of the gastrointestinal organs involved and consistency of diarrhea.

Most of Pakistan's veterinarians look forward to obtaining government jobs out of concern for their own job security and status. A real spirit of private practice lacks among veterinarians there. Orientation about private practice and the benefits of being your own boss and reaping more profits from private practice are not included in any stage of veterinary curriculum. Such has resulted in devastating brain and manpower loss. Thousands of veterinarians are without jobs and are involved in some odd jobs. The author of this article has stimulated veterinarians' interests in private practice, hence some private practices are now emerging in Pakistan and in neighboring countries. The more private practices that emerge, the more benefits the buffalos are likely to have.

There are a handful of farmers in Pakistan who are following modern farming methods. Such people in the community are politically influential and are already very sound in financial resources.

Ill planning of buffalo colonies in Landhi, Karachi continues to exist. Thousands of buffalo are kept in one large area and different farmers own these buffalo. Infection and disease can easily be spread as one farm is divided by wall or fence or no partition at all.

Most of the farmers in Pakistan have not heard of the term milk replacer. A calf that is one day or a week old is slaughtered because milk is relatively expensive and calves can consume a significant amount. If the calf is male, he is

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likely to be slaughtered when he is a day old for reasons of human greed.
Illegal electric wiring exists in some buffalo colonies. Non-professional, faulty wiring has burned many buffalo sheds and has put buffalo in the grips of fire while the animals were tied with chains. The author has witnessed such incidents and provided first aid.
No attention has been given to lameness in buffalo. Early signs of lameness are treated with whips or hard sticks when buffalo are reluctant to move. Ear parasites and foreign bodies in the ear, which can easily be treated, are never tended to by buffalo owners. This results in deep secondary infected wounds caused by buffalo self mutilation from irritation to the pina ear canal. Even obvious ingrown horns are not presented to veterinarians until a foul odor from the maggots gets the attention of buffalo owners.
Once the animal is terminal, the owners run to the veterinarians because after God, they put all their faith in veterinary medicine.
This gentle giant whose milk is consumed more than mother's milk in Pakistan can only survive by the development of good relationships between veterinarians and farmers. The government of Pakistan, the United Nations and veterinary schools have developed a program to put their time and finances into while waiting for a relationship to develop between farmers and veterinarians. Until then, everyone is going to suffer.

The inability of buffalo to walk because of laminitis is treated with a hard stick or whip.

Left Photo: Close-up view of welts at the hip and flank region. The welts show inflammatory changes.
Right Photo: Notice swollen left caudal teat, which was also whipped when the animal did not respond to muscular beating of the hip and flank.

The chronic nature of foot problems show the lack of the owneris concern to have them addressed through a veterinarian.

Left Photo: (Left) - Parrot foot. (Right) - Scissor foot.
Right Photo: Clubfeet.

Remark: These changes occurred in the course of several months to a year.

Left Photo: Normal lower limb of buffalo.
Right Photo: Abnormal lower limb of buffalo.

Old chronic changes are due to dactylitis, "foot rot". Proliferation of the bone involves the (1) metacarpal bone, (2) first phalanx and (3) caudal aspect of second phalanx.

THE DEVELOPMENT OF BUFFALO BREEDING IN AZERBAIJAN

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[1] **President, Azerbaijan Association of Buffalo Breeders.**
[2] **President, Guba Livestock Association.**

Azerbaijan is a country with a long tradition of buffalo breeding. It is also a country with tremendous scientific, industrial and natural forage resources suited for efficient rearing of these animals. Azerbaijan scientists have taken part in several international forums and events organised by the Food and Agricultural Organization of the United Nations (FAO) on this subject. For example, in 1964 Dr. Eyyub Bashirov delivered a speech on the Biology of Buffalo Breeding and Artificial Insemination at the Fifth International Congress on Biological Issues. In 1978, an Indian-Soviet Symposium on buffalo breeding attended by scientists from around the world was held in India. The head of the Azeri delegation was Dr. I.R. Abilov, who was Deputy Minister of Agriculture of the Azerbaijan Soviet Socialist Republic. Prof. A.A. Agabeyli and Abilov both delivered speeches at the symposium. In September 1984, a Soviet-Indian Symposium organised by Abilov and E. Bashirov on the subject of Modern Problems of Buffalo Breeding took place in Baku, Azerbaijan. Scientists from Azerbaijan, Georgia, India, Bulgaria and other countries delivered speeches at the event. In December 1985, Abilov delivered a very interesting speech on the development of Buffalo Breeding in the USSR at the First International Congress in Cairo, Egypt. At this time, Abilov was a member of the International Federation of Buffalo Breeders, as well as a member of the Azerbaijan Permanent Committee on Buffalo Breeding. In June 1991, several scientists from Azerbaijan (Dr. Zulfugar Verdiyev, Ashraf Mammadov, and Nariman Shrinov) participated to the International Congress of Buffalo Breeding in Varna, Bulgaria. (Addition from the Buffalo Newsletter Editor: In October 1997, at the Fifth World Buffalo Congress held in Italy, prof. Turan Turabov of the Azerbaijan Agricultural Academy, delivered a speech on the state of the research in buffalo breeding in Azerbaijan).

It is important to note that buffalo breeding has a very long history in Azerbaijan. It has always been a traditional industrial sector in Azerbaijan. Prof. A. Agabeyli (1939-1980) founded a buffalo breeding research centre that was instrumental in creating a new Cucasian breed of buffalo. Azeri scientists worked on this project in collaboration with leading buffalo breeding specialists. Azerbaijani buffalo experts have written a great deal of valuable scientific works, textbooks, and articles. Several PhD and Doctoral theses written by Azerbaijani buffalo breeders also exist. FAO and UNESCO were also responsible for publishing books on the subject written by A.A. Agabeyli, E. Bashirova, M. Aliyeva and I. Allahverdiyeva.
Under the direction of prof. Eyyub Bashirov, scientists of the Azerbaijan Scientific Livestock Institute have been working on buffalo breeding issues since 1951. The work of the Institute scientists led to the creation of a number of specialised buffalo breeding farms. As Azerbaijan reared 85% of all buffaloes in the USSR, it was the only country in the Former Soviet Union where buffalo breeding research was carried out . Azerbaijan coordinated all buffalo breeding research in the Former Soviet Union. In the beginning of the 1960s, Bashirov and Aleko Alekseyev were instrumental in creating a new breed of buffalo called the Bulgarian Murrah. This breed is now well known worldwide and was used to create the present day Azerbaijani buffalo breed.
After the collapse of the USSR, Azerbajan faces a tremendous problem in finding the resources to fund further buffalo breeding research. The privatization process transferred ownership of former collective buffalo breeding farms to individual farmers. However, the reorganisation of new buffalo breeding farms is hindered by a lack of finances. For example, the case of Dr. Akif Farajev, President of the Azerbaijan Association of buffalo breeders, is representative of this problem. Farajev established the Yavar Bini Oglu buffalo breeding farm in 1991 on the Caspian see and Akushka River in the Khazar village of Neftchala region. The farm originally began with 22 buffaloes. Despite the huge challenges, the farm has grown to 200 buffaloes. The farm is now quite productive – each buffalo produces 1,500-2,000 kg milk with a fat content of 8-10% during lactation and sterility among buffalo females has been eliminated.
With the help of the International Development Division of the American agribusiness company Land O' Lakes Inc., Farajev was able to set up a small dairy processing facility with the capacity to produce several kinds of ethnic dairy products. These products are very popular among the local population due to their high quality. Farajev produces two varieties of cheese, butter, sour cream, kaymak (which is an ethnic product similar to sour cream), gatig (yoghurt), cottage cheese and ayran.
In the transition period, following the fall of the

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Soviet Union, no research facilities or governing bodies existed to assist buffalo breeders. As a result, the number of buffaloes in many regions of Azerbaijan fell drastically. Valuable breeds of buffaloes were slaughtered for meat. In order to prevent this shortage, the President of Azerbaijan, Heydar Aliyev, issued a decree on the Preservation of the Local Livestock Gene Pools in Azerbaijan. The Azerbaijan Association of Buffalo Breeders played a big role in passing this law.

The Azerbaijan Association of Buffalo Breeders was founded in December 2001, with the support of the Vice President of the World Association of Buffalo Breeders, the President of the Bulgarian Association of Buffalo Breeders, Dr. Aleko Alekseyev. The formation of this Association signals a new era in the development of buffalo breeding in Azerbaijan. In order to perform its mission of developing this sector, the Association requires financial support.

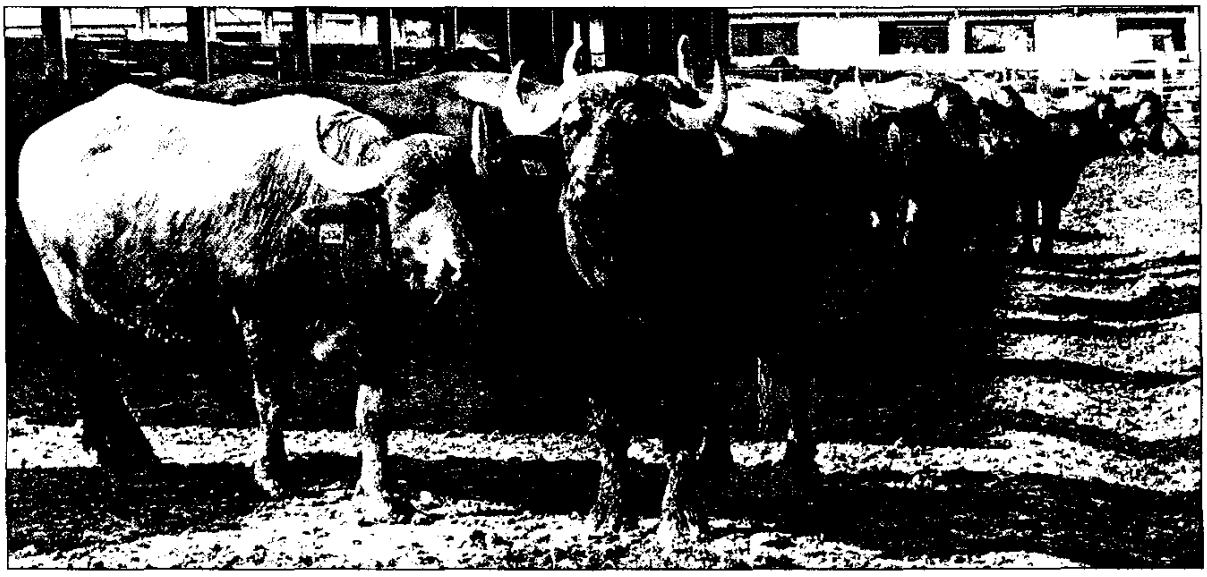
At present, there are 300,000 buffaloes in Azerbaijan, including 140,000 female buffaloes with an average milking rate of about 1,200-2,600 kg (8-10% fat content). On state supported buffalo breeding farms there are 920 buffaloes, including 250 female buffaloes.

The main problem hampering the development of buffalo breeding in Azerbaijan is the absence of high quality reproductive buffaloes and a lack of artificial insemination facilities. These problems are the result of financial difficulties. It is important to point out that Azerbaijan has a cache of under-used resources to devote to the development of buffalo breeding. Financial assistance is needed to assist in the advancement of this sector.

The above note is here reproduced to let the Azerbaijan buffalo industry to be known world wide. It was published in the "AZERI MILKMAN", the Journal of the Azerbaijan Dairy Industry, issue 2, April-May 2002; the journal is produced by the Azerbaijan Dairy Processors Association and Land O'Lakes PAPA Project. For subscribing or advertising information to this journal, contact: Azeri Milkman, 28 May st., 4/2. Baku, Azerbaijan 370014. E-mail kenul@lol.azeurotel.com.

ERRATUM. In issue no.16 of the Buffalo newsletter, page 9, **Table 1, "Cryoscopical indexes, pH and somatic cell numbers, according to farm type and season"**, replace the values of Somatic cells as follows:

FARM TYPE	SMALL	=	111.059[b]
	BIG	=	140.756[a]
	RMSE	=	78.209



Buffaloes in the paddock at Tor Mancina farm (Monterotondo, Italy).

BUFFALO DEVELOPMENT IN CHINA

Luigi Zicarelli

Department of Animal Production, University of Naples, Italy

The Italian visit to China was organized by the EC-China Water BuffaloDevelopment Project. I was invited to give a main lecture on "Mediterranean Italian buffalo industry" to the "International Strategy Symposium on Water Buffalo Development", which was held in Kunming, in Yunnan province, on April 16-17th, 2002. After the meeting I went on a field trip to Dali, north of Kunming where I visited an AI Station, buffalo household herds and a buffalo show. During the week I had a chance to discuss with the Chinese people several issues regarding buffalo management, reproduction and milk production. At the meeting I was introduced to the BRI (Buffalo Reproduction Institute) people from Nanning who are more interested in "in vitro embryo production" (IVEP) in buffalo.

Buffalo population in China was estimated 22.6 million in 2000. In China the predominant buffalo is the swamp type, like in Thailand, where a decline in buffalo numbers has been registered in the last 10 years. Factors associated with this decline in buffalo numbers include (a) pressures on grazing land, with an increasing human population requiring more land for rice and vegetables production, with less available for grazing, and (b) economic and political pressures to increase efficiency of agricultural production. This can so often mean the encouragement of a switch from animal to machinery and tractors in cropping. Although pressures on buffalo numbers are similar in China, the population has remained relatively stable in the last decade. However the future for buffalo in China is likely to be dependent on the development of buffalo milk industry, especially in the southern provinces, where there are both large populations of buffalo, and also a large and increasingly affluent human population, with very limited access to fresh cows milk and cows milk products.

Milk consumption in China is currently very low by world standards. For example, Xu (2002) refers that it is only 7 kg/head per year, when the current world average is close by to 90 kg/head. The expectation is that by 2010 milk consumption in China will increase to 16 kg/head. In China, buffaloes produce only about 0.1% of the total milk, from perhaps only 10,000 milking (crossbred) females. This figure for the contribution to total milk supply is in stark contrast to that in India and Pakistan, where buffalo milk represents 54 (Batoyal, 2001) and 70 percent (Khan, 2001) respectively of milk used for human consumption.

Of course the swamp buffalo is a low milk producing type – Xu (2002) reports production levels in the region of 500-700 kg per lactation. The swamp buffalo dam is often considered such a poor milker that its production is often less than adequate for the calf, and that any "surplus" milk will only be consumed within the farm household. In order to increase milk production, Chinese started to cross the swamp buffalo with riverine types, such as the Murrah from India and Nili Ravi from Pakistan, obtaining better performances. Results indicate the potential contribution that crossbreeding with riverine types could make to buffalo milk production in China, and help ensure a profitable buffalo industry in the country's southern provinces.

One of the aims of the EC-China Water Buffalo Development Project is to eliminate swamp males from rural areas, with the farmers relying instead on an upgraded AI service, using semen (commonly now in straw form) from Dali or Nanning. The increased numbers of crossbred (river*swamp) buffaloes are attracting considerable interest in southern China, even if in Yunnan no crossbred females are as yet being milked. However the increased size of the male and castrate offspring already holds out the promise of increased meat production.

Farmers are still very likely to see their future as being primarily for draught. While feed requirements will be greater, in accord with higher mature weight, the larger crossbred animals are likely to be more useful as draught animals. It should be pointed out here that riverine buffalo in India and Pakistan have for long been used for draught, and that this was also true for Italian buffalo in the past. In other words, there is no reason to think that this aptitude will be lost.

A more ambitious project will aim to the development of specialized dairy herds.

A major difference is that in this case buffalo will not be bred for draught purposes, so that herds of milking buffalo must be justified on their profitability for that specialised purpose.

In this scenario aspects like nutrition, management, reproduction need to be optimised. The possibility to modify the annual pattern of buffalo milk production to meet consumer demands is another area that will require attention in the future. In Italy the out of breeding season mating strategy (OBSMS) has been successfully used to modify reproductive activity and hence milk production patterns in order to meet the market demand for mozzarella cheese (Zicarelli 2002). Without implying that the need will be as great as in Italy, where the demand for mozzarella cheese, which has a very short shelf-

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life, is very seasonal, at Nanning they have also seen very wide variations in seasonal milk production, due mainly to seasonal differences in calving patterns. Guangdong has already reported a mismatch between buffalo milk supply and demand, with insufficient milk available in the summer months (Lin, 2002).
This is the reason for which Chinese look with interest at the Italian model of buffalo husbandry. In Italy there are several farms which are very profitable and competitive as a result of optimal management. Because of its high milk production, resulting from good management and high genetic value, the Mediterranean Italian buffalo is in high demand around the world.
As above mentioned Chinese have been crossing the swamp buffalo with riverine types, such as the Murrah from India and Nili Ravi from Pakistan, in order to increase milk production. A more likely source of exotic material would be from Italian Mediterranean Buffalo, and it is interesting that authorities in Yunnan province in China are currently giving serious consideration to the importation of Italian buffalo semen. This project should be encouraged, given the high genetics and hence performances of Italian Buffalo although it has to be considered that no information are available on the combinability of crossbred swamp*river-Italian buffalo, in terms of productivity.

Local factors may affect the introduction of the Italian model of buffalo husbandry in China. Buffalo herds in Italy are large. If we look at herds registered with ANASB, we see that the majority are in the region (class) of 100 - >200 cows, with many farms with more than 300 cows.
On the contrary in China water buffalo are commonly in household herds of up to 6 heads, with perhaps 2-3 females. The consistency of heads/farm may imply difficulties in the application of the Italian model of management. In addition to this it is worth mentioning that cultural differences may impair the development of buffalo milk industry. Due to the gastronomic differences it is likely that the milk produced will be still consumed mainly as drinking milk since products like our mozzarella cheese may not be appreciated as tasteful. An other extremely important aspect to consider is that in order to increase animal production, feed requirement will be higher. It results a decrease of vegetable production to use for human consumption, aspect which needs serious consideration in a developing country. This problem may be overcome only by increasing lands to be exploited for rice and vegetables production or by importing feed for the animals. Unfortunately we have not the crystal ball to answer to these questions and predict the future of buffalo in China.

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MILK PERFORMANCE RECORDING

The second set of statistics on "Yearly inquiry on the situation of milk recording in buffalo – Results 2000" was presented at the 33rd Session of the International Committee for Animal recording (ICAR) at Interlaken, Switzerland (27-31 May 2002). The statistics include results of milk performance recording activity in 13 countries; the hard copy is available upon request to the Editor of the Buffalo Newsletter; electronic copy is available at www.icar.org , click on "Yearly inquiry".

THE FIRST BUFFALO SYMPOSIUM OF AMERICAS

The first Buffalo Symposium of Americas was held in Belém, Parà, Brazil, from 1st to 8th September, 2002, organized by Roberto F.S.R. da Fonseca, President of the Organizing Committee and President of the Buffalo Breeders' Association of Parà, and by prof. William G. Vale, Scientific Secretary. Proceedings of the Symposium, of which W.G. Vale is the Editor, consisted of one CD-rom and a Book of over 600 pages, including 36 keynote lectures – selected by the Scientific Committee – and 75 full papers presented by participants of 25 countries: all countries of Americas as well as scientists of Europe and Asia, where buffalo plays an important role in the economy of the country. Lectures and papers were distributed in the following sessions: animal health, nutrition and feeding, reproduction, genetics and breeding, animal behaviour and environment, meat and milk technology, agrobusiness and marketing.
The Symposium demonstrated that farming systems in the Americas are going through a fast and consistent development and the strategies to spread out buffalo farming in South America are well progressing.
During the Symposium, on September 3rd, an informal meeting of the International Buffalo Federation (IBF) wad held for the members that were present there, as follows: A. Borghese (Secretary) and R. Garofalo (Italy); W. Vale, J.G. de Almeida and P. Baruselli (Brazil); J. Reggeti and H.A. Scannone (Venezuela); M. Zava (Argentina); J.A. Berduco Gutierrez (Colombia), T. Peeva (Bulgaria), M. Kamonpatana (Thailand). After long discussion on the activities that should be carried out by the IBF during the years between the congresses, the following conclusions were reached:
– give notice of meetings and events concerning buffaloes through e-mail and Buffalo newsletter;
– create a web site in Rome of IBF activities
– make IBF better known all over the world
– organize a seminar on buffalo in Cuba in 2003
– organize a meeting in Rome (28-31 August, 2003) in the context of the Satellite Symposium on Buffalo Reproduction of the European Association for Animal Production.

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