Buffalo Newsletter

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

From the editor

I would like to thank the readers of the Buffalo newsletter and particularly those who have contributed some interesting papers that you can read in this issue. Due to the growing interest of international research cooperation, we have decided to help the reciprocal knowledge of the research institutions which are doing research on buffalo worldwide. We have therefore created a new section in this journal where any research institute will be able to inform al readers of the ongoing research activities. The Veterinary Research Institute of Peshawar, Pakistan, will open this section. We invite all Institutes to submit their

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INSIDE THIS ISSUE

PROGENY TESTING NILI-RAVI BUFFALOES. RANKING OF BULLS FOR FIRST SIX BATCHES

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ABSTRACT

First lactation milk yield records of farm and field recorded Nili-Ravi buffaloes involved in the progeny testing program were used for evaluating buffalo bulls under an animal model. The data comprised 863 farm and 671 field recorded lactations. Buffaloes at the farm were recorded weekly while at field level recording was done approximately monthly. Completed lactations on daughters of 78 bulls of first six batches were available for analysis. Average milk yield was 2178 kg for an average lactation length of 300 days. At first calving average age of these animals was 50 months. With the exception of two, all the bulls had left (or died) the Semen Production Unit. Of 59000 semen doses obtained from these bulls, 37000 were from above average bulls (more than zero estimated breeding value), while rest were from the below average bulls with a maximum of 8000 doses for any single bull being progeny tested. Recently born bulls had on average higher breeding values as compared to older bulls which depicts a positive genetic trend in the bull population for first lactation milk yield. Improvement in the population, in general, would be achieved when bulls with higher breeding values leave more offspring as compared to bulls with poor breeding values. Animal identification seems to be a major challenge both at farm and field level. Improvement in recording procedures should lead to increased accuracy at field level in the future. Frequent evaluation and sustained efforts are required for long-term improvement.

INTRODUCTION

Progeny testing program of Nili-Ravi buffaloes at field level was started in 1985 with buffaloes completing their lactations as early as in 1987. Initially, in addition to the animals at Livestock Production Research Institute, Bahadurnagar (Okara), selected populations, such as those of the military farms, were also included; however, insufficient number of trained personnel and other administrative and financial difficulties limited the field recording to the present 27 subcentres.
First batch had only four purchased bulls (from high producing dams) tested in the institutional herds. Second batch had one purchased and three farm produced bulls. The

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information according to the scheme used in the section. We look forward that the readers will be able to find partners for future cooperative research projects on buffalo.
Moreover, I want to inform you that The FAO Buffalo Research Network has established a new Working Group on buffalo recording and genetic resources.
The new Working Group has now two main objectives:
1. to promote animal recording systems in buffalo world wide;
2. to carry out comparative studies on genetic diversity of buffalo. In this respect, the group is carrying out a bilateral project (Greece and Italy) on animal genetic diversity in buffaloes and Egypt has recently agreed to participate in this project. In the section "Buffalo news" you will read details on the activities of the new established Working group.

Prof. Antonio Borghese

Milk recording at a small farm, Okara, Pagistan

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third batch had 16 bulls, the daughters of which were randomly distributed in the institutional herds and other populations. These bulls were born in 1980-81. The bulls included in the 4th, 5th and 6th batches were born during 1982-86. Information on these six batches in being reported in the present study. The bulls in the subsequent are at different stages of evaluation and the data gathered on their daughters are likely to be added to the information from previous batches for evaluation in the future. Although production of a batch of bulls every year was envisaged in the beginning, but the production and evaluation of bulls have faced many administrative and financial problems. Evaluation of first two batches have previously been reported using contemporary comparison (Chaudhary et al., 1988; Asghar, 1988), while evaluation up to the third batch has also previously been reported (Khan, 1998). The combined genetic evaluation for 78 bulls in the first six batches using Best Linear Unbiased Prediction (BLUP) methodology has been being reported in the present study.

Table 1. Distribution of lactations for different herd-year-season (HYS) combinations.

Number of lactations	Number of HYS
≤ 10	2
11-20	11
21-30	9
31-40	9
41-50	6
>50	6
Total	43

METHODOLOGY

First lactation records of 1534 buffaloes for first six batches of bulls along with the pedigree and performance records of farm born animals up to 1965 were used in the present study. The first lactation milk yield adjusted for age at calving were assumed to have fixed effect of herd-year-season along with random animal and residual effects. The two locations (field and farm) were assumed as two herds and 17 classes were defined for year of calving by pooling the consecutive years. First year-class being ≤1965 and the last being 1996-97. Two seasons of calving were winter and summer. A total of 43 such combinations could be defined with distribution of lactations given in Table 1.
The adjustment of milk yield records for age at calving to 60 months was made according to Khan et al. (1993). For field recorded buffaloes, if information on the date of birth was missing, age at calving was assumed to be four years for adjustment purposes. Lactation length varied but no adjustment was made because of lack of information on the reasons of drying. Last recorded milk yield was also not available for extension as suggested by Chaudhary (1998). All the relationships were incorporated in the relationship matrix making the total animals represented in the relationship matrix to be 1722. Genetic groups for animals with one, two or both parents missing were defined separately for the four genetic paths (Westell and Van Vleck, 1987). For the ratio of error to animal variance, first lactation milk yield was assumed to be 18% heritable (Khan et al., 1997). Data manipulation was done by SAS (1990) while

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Milk recording is the base for progeny testing (Pakistan farm).

estimated breeding values (EBV) and accuracy were worked out by JA2 (Misztal, 1992).

RESULTS AND DISCUSSION

First lactation milk yield for 1534 buffaloes averaged 2178 kg with an average lactation length of 300 days. Average age at first calving in the data set was 50 months. Although, age at first calving reported was as high as seven years and lactation length as short as 53 days, no editing was done for the two traits (Table 2). Deleting records for values towards the two extremes would produce averages more similar to previous studies (Khan, 1998). A higher first lactation milk yield average on the other hand may also be due to the fact that most of the field recorded data used in the present study had been adjusted to 305 days basis. Age-adjusted milk yield was higher than the actual milk yield because of higher base (60) months.
The data set from LPRI (Bahadurnagar) for first lactation records of buffaloes calving in 1965 was also merged with the daughters of 78 bulls from the first six batches. Thus 119 bulls were represented in the data set including those contributing in the relationship matrix. Of 78 bulls tested so far, semen doses (at least 100) were available for 40 bulls whereas two bulls were still alive. Of 59000 doses of semen available from these bulls, 37000 were from above average bulls (more than zero EBV), while the remaining 22000 were from the below average bulls with a maximum of 8000 doses for any single bull being progeny tested.
Recently born bulls had on average higher breeding values as compared to older bulls which depicts a positive genetic trend in the bull population for first lactation milk yield.
Because breeding values are assumed to be distributed normally, with mean zero and additive genetic variance, half the bulls are always above average (positive breeding values) and the other half below average (negative breeding values). Thus improvement in the population, in general, would be achieved when bulls with higher breeding values leave more offspring as compared to bulls with poor breeding values. Failure to achieve this would result in the wastage of time and resources. Under the given circumstances there is a lot of scope for improvement.
Genetic evaluation of some of the bulls included in the present study have previously been reported (Chaudhry et al., 1988; Asghar, 1988; Asghar et al., 1992). The major limitations with evaluations done earlier was the method employed (some form of contemporary comparison), without correction of lactation records for environmental factors such as age at calving. Pedigree information was ignored and animals were assumed as being unrelated except the relationship between bulls and the daughters. Some of these issues have previously been discussed (Khan, 1998a). Thus the bulls in the current analysis have ranked differently than that of previous evaluation. The rank correlation between this and earlier evaluation and evaluation using contemporary comparison was less than 0.7 which indicates a wide disagreement between the two evaluation methods. Also, bulls across different batches were not comparable previously, whereas present evaluation has made it possible.
Only two herds were assumed for the current analysis and number of daughters recorded per bull has been quite low resulting in poor reliability of EBV's (Table 3). This seems to be a general problem with buffalo progeny testing programs. The average number of daughters of 24 Surti bulls reported by Jahageerdar et al. (1992) was 7.5 with a maximum value of 19. The average number of daughters in the present study was 12 with a range from 1 to 59.

Table 2. Average statistics of performance parameters.

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Age at calving (months)	27	89	50
Actual milk yield (kg)	203	4809	2178
Age adjusted milk yield (kg)	232	5434	2513
Lactation length (days)	53	614	300

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Only 14 bulls had ≥25 daughters. This of course is a very low number as compared to international standards but is expected to improve in the future. It is also pointed out that many of the bulls used did not have pedigree information which may also not be acceptable if semen of these bulls is considered for export. Preliminary selection of bulls in future would be done on the pedigree basis from the top ranking buffaloes at different institutional herds or from buffaloes recorded in the field. Bulls from show-ring winning buffaloes would continuously be included. Sire and dam information would thus be required for bulls to be included in the progeny testing program. Methods to estimate lactation performance from milk yield recorded for few days would however, be needed. Selecting bulls from field recorded buffaloes will not only decrease inbreeding, but also provide incentive for the farmers and encourage field recording. Data recorded should at least be updated every other month and bulls be re-evaluated so that preliminary selection of those having sufficient daughters may be carried out and more semen doses can be collected from the top ranking bulls. Discussion on minimum number of daughters to prove a bull have recently been presented (Khan, 1999). First proof should thus be available for any bull with five daughters (with at least two recorded with the institutional herds). Information on subsequent lactations (not included in the present study)

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Table 3. Breeding values of Nili-Ravi buffalo bulls for first lactation milk yield (kg).

S.No.	Batch	Bull	EBV*	REL**	S.No.	Batch	Bull	EBV*	REL**
1	1	7090001	-111.7	58%	40	4	8290121	167.5	32%
2	1	7290002	118.7	40%	41	4	8290122	-154.5	12%
3	1	7290019	-9.5	48%	42	4	8290123	47.9	19%
4	1	7390005	-102.6	27%	43	4	8390130	-169.8	39%
5	2	7194331	115.1	49%	44	5	8390125	118.0	37%
6	2	7195141	63.1	39%	45	5	8390127	134.5	32%
7	2	7292222	-357.8	43%	46	5	8390134	464.2	29%
8	2	7590038	149.3	22%	47	5	8390139	153.0	19%
9	3	8090061	-56.1	53%	48	5	8490124	-219.3	36%
10	3	8090062	66.1	55%	49	5	8490153	81.7	36%
11	3	8090063	116.4	56%	50	5	8490154	-21.9	39%
12	3	8090064	149.3	34%	51	5	8490190	78.5	16%
13	3	8090065	355.2	57%	52	5	8490227	-251.7	60%
14	3	8090066	-46.1	50%	53	5	8490235	-122.3	53%
15	3	8090067	-33.0	32%	54	5	8490237	256.4	65%
16	3	8090068	49.1	64%	55	6	8390143	-255.3	43%
17	3	8190069	-188.7	41%	56	6	8390321	-89.4	40%
18	3	8190089	-66.1	50%	57	6	8490167	39.2	36%
19	3	8190090	-281.1	69%	58	6	8490205	-109.0	19%
20	3	8190093	-85.5	42%	59	6	8490214	-64.0	36%
21	3	8190094	-332.9	49%	60	6	8490239	270.2	48%
22	3	8190095	178.7	35%	61	6	8590241	-154.3	46%
23	3	8190096	-26.6	40%	62	6	8590242	-150.4	47%
24	3	8290101	-118.8	26%	63	6	8590243	56.0	49%
25	4	8290004	-170.4	24%	64	6	8590247	27.3	31%
26	4	8290076	-158.9	16%	65	6	8590248	104.5	61%
27	4	8290077	369.5	65%	66	6	8590251	-145.4	19%
28	4	8290078	-20.7	22%	67	6	8590254	405.7	52%
29	4	8290098	-30.2	52%	68	6	8690245	-211.0	55%
30	4	8290099	61.1	41%	69	6	8690246	173.9	28%
31	4	8290100	-112.0	38%	70	6	8690249	-170.0	44%
32	4	8290102	71.7	21%	71	6	8690253	47.6	50%
33	4	8290111	155.9	30%	72	6	8690255	-21.1	27%
34	4	8290112	-38.0	28%	73	6	8690257	-68.4	33%
35	4	8290116	142.9	44%	74	6	8690258	-59.1	36%
36	4	8290117	-72.4	36%	75	6	8690259	-34.5	37%
37	4	8290118	-120.9	33%	76	6	8690260	185.6	41%
38	4	8290119	671.2	35%	77	6	8690262	151.1	40%
39	4	8290120	144.8	30%	78	6	8690265	-66.5	34%

* Estimated Breeding Value. **Reliability/Accuracy of information.

although expensive to collect would help improve accuracy in the future.
Identification of animals seems to be a major challenge especially at field level. There needs to be a system where every calf born has a permanent identification and this be checked or reported to/by the administrative unit concerned. A well thought out uniform identification system should be adopted to remove confusions/mistakes. Pedigree information has to be maintained by the institution involved in the progeny testing program until some Farmers' Association or other such organisation can take the responsibility as is the practice in some countries. The accuracy of milk recording at field level is also low and needs further improvement.
A strong relationship between education, research and extension and dedication of those involved in the endeavour, can help bring the desirable improvement in buffaloes in the future.

General suggestions:

- The current efforts of LPRI in this respect are commendable. Yet, the present infrastructure does not seems to be very efficient and sufficient. Thus a separate institute/organization (such as buffalo research institute) might well accomplish the job of bull evaluation more competently.
- Discontinuity of efforts (lack of sustainability) as in the past is likely to damage the cause. Enhanced number of technical and extension staff (qualified and trained in the subject) is urgently needed. Increased funds and facilities are required for better data collection, processing and mobility of the staff.
- Artificial insemination of buffaloes is acceptable but availability of bulls for natural service and poorer response of AI may still urge the owners to go for natural mating. This is not only detrimental to the whole progeny testing program but can also lead to breed deterioration (feared at present) instead of breed improvement. The issue needs serious thinking for implementation both at farm and field level.
- Identification of sire and dam of every new born both be recorded and authenticated both at farm and field level.
- Technical facilities for semen production and evaluation be strengthened for routine semen collection and preservation. Bulls brought to the centre and put on progeny test should not only be of ideal type but should preferably have pedigree information (sire and dam known and performance recorded).
- Testing for known genetic anomalies is expensive but bulls to be selected at younger age should be selected from lines known free from such anomalies. Reporting system (description of the calf born) also needs changes/improvement.
- Improvement of adjustment procedures (environmental sources) and development of test day model are needed in the near future.
- Compulsory participation of all the buffalo farms and more frequent evaluation should help improve reliability and genetic gain.

ACKNOWLEDGEMENTS

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EFFECT OF SOME CLIMATIC FACTORS ON IRAQI BUFFALO PERFORMANCES

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Productive and reproductive records (756) of 215 Iraqi buffalo cows during 1971-1991 at Missan Experimental and Research Station, University of Basrah, were statistically analysed by unbalanced least square method. The records of Amara meteorologic Station were used to determine the monthly mean temperature, relative humidity and sunshine duration during the same period of study. The object of this study was to know the effect of these climatic factors as well as the effect of buffalo origin (Missan, Thee-Qarr, Baghdad and Niniveh) and season on some productive and reproductive traits of Iraqi buffaloes. Results are here reported.

1 - The following overall means were obtained:
age at first service (AFS): 27.40 months;
age at first calving (AFC): 37.75 months;
gestation period (GP): 302.75 days;
birth weight (BW): 40.12 kg;
total (corrected to 305 day) milk yield (TMY): 1411.35 kg;
lactation period (LP): 256.53 days;
service period (SP): 120.24 days;
dry period (DP): 173.14 days;
calving interval (CI): 425.36 days.

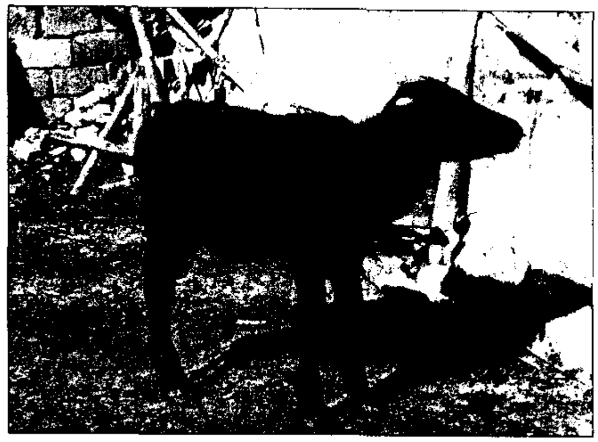
2 - Origin of the dam had a highly significant effect ($p<0.01$) on BW, TMY, SP and CI. Dams from Baghdad gave a heavier calf (BW=41.98 kg), higher TMY (1550.55 kg), shorter SP (94.66 days) and shorter CI (389.10 days) in comparison to buffaloes from Missan (38.71 kg, 1340.41 kg, 151.13 days and 452.20 days for each parameter). Buffaloes from Thee-Qarr had the longest ($p<0.05$) lactation period (268.25 days), whereas those from Niniveh had the shortest (246.71 days). DP of the buffaloes from Baghdad was significantly ($P<0.05$) shorter (154.56 days) than that of the buffaloes from Missan (246.71 days).

3 - In spite of the non significant effect of birth season on AFS and AFC, buffaloes born in Autumn had an early first service and calving (26.89 and 37.13 months respectively).

4 - Season of mating showed a significant effect ($p<0.01$) on GP. Buffaloes mated during Summer had longer gestation (317.7 days), while the ones mated in Winter had the shortest period (299.23 days). Season of mating had also a significant effect ($p<0.05$) on BW. Buffaloes mated in Autumn gave heavier calves (BW=40.46 kg) than those mated during Spring (39.06 kg).

5 - Calving season had a highly significant effect ($p<0.01$) on SP and CI. Autumn calving had shorter SP (96.95 days) and CI (401.55 days), whereas Spring calving showed longer SP (165.40 days) and CI (468.97 days). On the contrary, effect of calving season was not significant on TMY and LP.

6 - Dry season showed a highly significant effect ($p<0.01$) on DP. Buffaloes dried during Summer and Spring had the shortest DP (54.01 and 157.35 days respectively) compared to the buffaloes dried during Autumn and Winter (205.18 and 209.74 days respectively).



BUFFALO CALF IN IRAQ

7 - Temperature affected significantly ($p<0.05$) TMY and SP. TMY decreased with an increase in temperature within the same season except Winter. Higher milk yield (1403.01 kg) was obtained by buffaloes that calved when the temperature ranged from 32.7 °C to 35.8 °C (Summer) and the lowest yield (1312.54 kg) when temperature ranged from 8 °C to 12 °C (Winter). SP decreased with an increase in the temperature in Spring and Summer.

8 - The effect of increasing relative humidity was in contrast with the effect of the temperature on most traits. AFS ($p<0.01$) and AFC ($p<0.05$) were significantly affected. Buffaloes that calved at 46-70% humidity level in Autumn were later in AFS (31.28 months) and AFC (41.06 months) compared to the ones that calved at humidity level of 25-35% in the same season (25.38 and 35.71 months respectively).

9 - Levels of humidity of 49-72% also gave better ($p<0.01$) TMY (1546.69 kg); however, yield decreased to 1326.25 kg when the level of humidity increased to 68-82%. The longest LP (287.3 days, $p<0.05$) was noted when humidity level was 25-48%; the shortest (241.9 days) when humidity was 68-82%.

10 - Effect of sunshine duration was similar to the effect of temperature and in contrast to the effect of humidity within the same season in most of the considered traits. It was significant ($p<0.05$) on TMY and GP. Higher milk yield (1625.45 kg) was obtained by the buffaloes that calved when the sunshine was 6.8-8.9 hr/day. The longest GP (318.95) was showed by buffaloes mated during 11.5-13,2 hr/day and the shortest by animals mated during 4.6-6.7 hr/day of sunshine.

RECONSTRUCTIVE AND PLASTIC SURGERY IN WATER BUFFALO CALF

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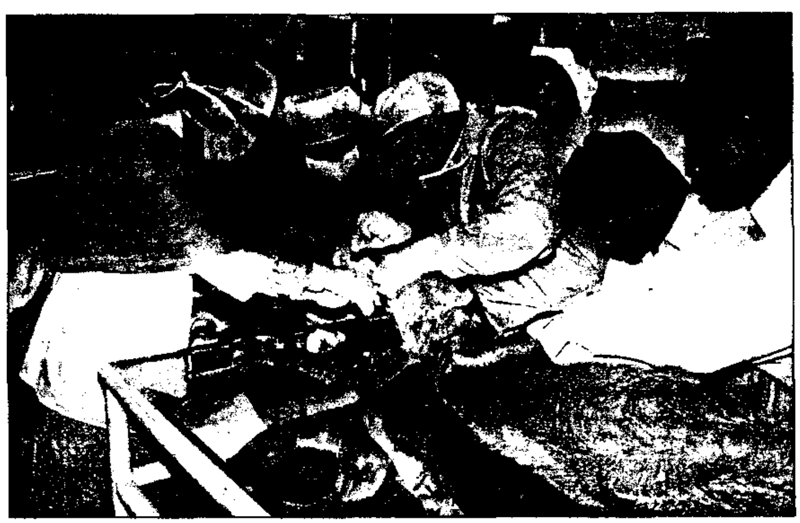
Faculty of Animal Husbandry and Veterinary Sciences at its veterinary clinics provide multiple services to public free of charge. These services include routine health care for water buffalo, treat infectious diseases, metabolic disorders and diseases, respiratory diseases and other. Both students and farmers benefit from this clinic. A new approach to water buffalo for treatment of disorders is practiced there. Routine blood work, radiograph and ultra-sound diagnostic tests for water buffalo are not unusual everyday work there. Ultrasound is not only done for reproductive tract but it has its best appication in mastitis diagnosis and lactic obstructive structures of buffalo mammary tissue.

Birth defects are not unusual in buffalo calves. Here is one case that was presented to the veterinary clinic: a calf, with apparently two tongues and three rostral mandibles and with three times the lower incisor teeth. Closer examination revealed that tongue was cleft at its base and extra rostral mandibles were placed in the roof of the mandible caudal to lower incisors and were in solid focal bony mass. All extra incisors were placed in this bony mass.

A plan of surgery was made not to disturb normal anatomy of mandible and tongue. A two step surgery was designed. One step was to remove bony structure and second step to perform soft tissue surgery on the tongue. Surgery was designed in the manner that it was economical and effective and which could be performed in field cases. Human treatment to the calf was also considered so that the animal did not experience radical pain or discomfort.

On day one a female calf was anesthetized with Diazepam and Ketamine anesthesia. Using a Gigli wire and handles, a bony structure along with extra incisor teeth were excised. This procedure took place in less than a minute. Bleeders were checked with absorbable sutures and antiinflammatory and antibiotics were administered to calf to prevent swelling and secondary infection. Calf was in ambulatory for half an hour and showed no distress. Second step was to perform soft tissue surgery on the tongue. On day seventh, the calf was anesthetized with the same anesthetic protocol and edges on the medial side of the tongue were debrided and both medial edges were closed with 0 vicryle suture material which is an absorbable suture. This procedure took place in less than ten minutes. The calf was ambulatory once again in thirty minutes, developed good control on the tongue and continued to suck milk. The eight week old female calf was much at ease after the corrective surgery.



CORRECTIVE SURGERY IN BUFFALO CALF

FATTY ACIDS, MINERALS AND VITAMINS OF WATER BUFFALO MILK IN ARGENTINA

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INTRODUCTION

In Argentina there are presently three breeds of economic importance: the "Mediterranea" (70% of the water buffalo population), the "Murrah" and the "Jafaradabi". All are of double purpose - meat and milk - and sometimes triple purpose as they are often employed for work (Zava, 1995).
The current water buffalo population in Argentina is estimated between 13,000 and 15,000 head. It is concentrated mainly in the subtropical humid areas of the northeast including Corrientes, Chaco, Misiones and the north parts of Santa Fe provinces. However, the country has other zones where water buffalo could be utilized as they have been shown do well in moderate and high elevations as well as the lower swampy areas.
Subtropical zones include about six million hectares, including the lower Santa Fe Province, the Esteros del Ibera in Corrientes Province, the low coasts of the Paraguay River, the delta of Parana in the Formosa, Chaco and Corrientes provinces and the delta of the Province of Buenos Aires (Zava, 1995)
Corrientes Province contains about 83% of the total buffalo population according to the National Agriculture Census of 1988 (INDEC, 1998).
Bubalus milk production is still a developing industry, but dairy facilities for the production of mozarella cheese presently operate in the Corrientes Provinces, Santa Fe and Buenos Aires (Machado, 1998; Patiño et.al., 1998; Carrazzoni, 1998).
The water buffalo milk produced in Corrientes, is characterized physically by white color, lightly sweet, density 1030, acidity 18.5 º Dornic, pH of 6.9 and chemically 17.2% as total solids, 7.6% of fat, 4.0% of proteins, 4.8% of lactose and 0.8% of ashy (Patiño and col. 1999).
The objetive of present work was to characterize fatty acids, minerals and vitamins of the water buffalo milk produced in Corrientes Province, Argentina and compare with other authors results.

MATERIAL AND METHODS

The present study was conducted during the first trimester of 1997 in the Santa Maria del Rosario Ranch located about 30 Km. from the city of Corrientes, in the Corrientes Province, Argentina. This facility has Murrah/Mediterranea milking water buffalo and uses the milk to produce a mozarella cheese.
The animals are maintained under a non-intensive natural pasture system and during lactation receive about 2 Kg/head concentrate supplement of malt dregs (brewers waste) per day.
Samples of milk (200 cm3) were collected monthly from 50 liter storage containers which contained milk from about 9-10 buffalo. Samples were labeled, identified and cooled until their delivery to the laboratory.
In the laboratory, samples were maintained at 4 ºC until processing. The samples were evaluated for fatty acids by extraction of fatty matter, saponification, derivation with BSTFA, quantification for GC (AOCS,1995). Calcium, phosphorus and iron by analytic methodology (AOAC, 1990 FIL - IDF). Vitamins A and E by saponification, extraction and quantification for HPLC / fluorescence; Vitamins B1, B2 and B6 by addition of buffer phosphate, centrifugation and quantification for HPLC / fluorescence.
Climatic data, including temperature, rainfall and humidity in the State of San Cosme was obtained from the Estacion Experimental Agropecuaria Corrientes of the INTA and from the Ministry of Production of Corrientes Province.

RESULTS AND DISCUSSION

The local climate in the region of the Santa Maria del Rosario Ranch is humid and subtropical, without dry seasons, warm in summer and with frost in winter.
Seasonal rainfall produces water surpluses in spring-autum and deficit in the summer months. Annual total rainfall averages about 1200-1400 mm/year. Mean temperature is 21.5 ºC (max 42-44 ºC; min -2 / -3 ºC). Mean humidity reaches 75%
The found chemical values were:
Fatty acids: Butiryc (C4:0) 1,29%; Caproic (C6:0) 1,23 %; Caprilic (C8:0) 0,70%; Capric (C10:0) 1,33%; Lauric (C12:0) 1,92 %; Myristic (C14:0) 9,77 %; Myristoleic C14:1) 0,82 %; Palmitic (C16:0) 28,86 %; Palmitoleic (C16:1) 2,14 %; Stearic (C18:0) 17,50 %; Oleic (C18:1) 30,78%; Linoleic (C18:2) 1,05 %; Linolenic (C18:3) 2,61 %. Fatty acids C4:0, C6:0, C8:0, C10:0, C12:0, C14:0, C16:0, C16:1, C18:2 and C18:3 are inferior to Kay (1974) and Jandal (1997) results; on the other hand the C14:1, C18:0 and C18:1 are superior. (Table 1).
Minerals: Calcium 147, 2 mg % g; Phosphorus 134, 2 mg % ; iron 84,3 ug % g . The values of Calcium and iron are below that settled down by Kay (1974), Ganguli (1979), Huhn (1982), FAO(1991) and Spanghero (1996); on the other hand the phosphorus presents similar results (Table 2)
Vitamins: A 90,35 UI % ml; E 0,220 UI % ml; B1 0,0899 mg % ml; B2 0,157 mg % ml; B6 smaller than 0,05 mg % ml. Vitamin A is lower than Kay

follows page 9 ☞

(1974)results; vitamins B1, B2 and B6 are similar to Kay (1974) results (Table 3).

CONCLUSIONS

The variations in the chemical characteristicts of water buffalo milk noted by various literature authors and observed in the product of the Santa Maria del Rosario Ranch can be attributed to seasonal factors, the effect of different techniques of analysis (Kay, 1974;FAO,1991), feed intake variation (Ganguli, 1979) or from the different lactation stages in which the samples were collected.

Additional regional studies of buffalo milk would be useful to establish procedures and standards specific for this product.

Acknowledgment:
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Table 1: Fatty acids in water bufalo milk according to different authors.

AUTHORs	C4:0	C6:0	C8:0	C10:0	C12:0	C14:0	C14:1	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3
	LENGTH OF CARBON CHAIN — PERCENTAGE												
Kay, (1974)	3.85	1.60	0.83	1.57	2.12	10.8	–	33.0	–	11.0	24.5	–	–
Jandal (1997)	3.90	1.40	1.60	2.90	4.60	10.50	0.40	36.90	2.20	11.20	17.50	1.20	4.7
Present work	1.29	1.23	0.70	1.33	1.92	9.77	0.82	28.86	2.14	17.50	30.78	1.05	2.61

Table 2: Mineral composition of water buffalo milk according to different authors.

AUTHORS	CALCIUM (mg %)	PHOSPHORUS (mg %)	IRON (ug %)
Kay, (1974)	0.18 - 0.20	0.12 - 0.13	97.5 – 126
Ganguli,(1979)	0.22	0.13	–
Huhn, (1982)	0.27	0.30	–
FAO, (1991)	0.18	0.12 - 0.13	–
Spanghero (1996)	0.20	0.12	–
Present work	0.14	0.13	84

Table 3: Content of vitamins in water buffalo milk according different authors.

AUTHORS	A (UI % ml)	E (mg % ml)	B1 (mg % ml)	B2 (mg % ml)	B6 (mg % ml)
Kay, (1974)	225	1.97 mg/kg	0.080-0.081	0.165 – 0.167	0.023 – 0.025
Present work	90.35	1.48	0.0899	0.157	Menor of 0.05

BUFFALO MILK MARKETING IN SMALL DAIRY HOLDERS IN CENTRAL PUNJAB, PAKISTAN

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INTRODUCTION

Only Punjab supplies 73% of the total milk production of Pakistan, whilst Sindh and other provinces supply only 23 and 7%, respectively, (Arain and Somroo, 1998).Out of the 20.7 million heads of buffalo, Punjab owns 71% (Samdani, 1998). The buffaloes supply 71% of the total milk produced.

The buffalo herds (43%) maintained by small farmers are comprised of six or less than six animals (Anon., 1986). There are 0.5 million land less farmers keeping dairy animals and contributing significant (70%) share in total milk production (Arian and Somroo, 1998). These small farmers mostly depend on revenue from sale of milk and other animal products to meet daily household expenditures. Milk price and its distribution are greatly governed by prevailing facilities of marketing. The producers linked with infrastructure get good price and can use higher inputs for increased production level but farmers living without road approach to market are strained for "forced home consumption" of their surplus milk (Gill and Patel, 1983) The higher prices of animal food products have changed the milk utilisation and marketing behaviour in rural areas. Absence of an organised marketing system for livestock and their products is another important limiting factor. Poor means of communication and the perishable nature of animal products offer a major challenge to the marketing experts and policy makers. The present research was aimed to study the prevailing milk disposal systems in rural areas and to devise strategies for improvement.

MATERIALS AND METHODS

322 farmers, living in 147 villages in central Punjab keeping at least one dairy buffalo were interviewed using a pretested questionnaire. The households were randomly selected per village according to the procedure described by Poate and Daplyn (1993). The selected farmers were interviewed for 30 to 45 minutes based on questions related with their milk production, sale and home consumption. The collected data of farmers were used to categorise them according to the land and animal holdings and nature of their land possession as given below;

1) Landowned Class (LOC) / Sole owner of land
2) Land Cultivated Class (LCC) / Land owned plus land shared in or shared out.

These classes were subdivided according to the landholdings viz. i) Less than 2 acres of land ii) from 2 to 12.5 acres of land, iii) more than 12.5 acres and iv) landless farmers. The farmers were also categorised according to the number of dairy animal and labelled as "Herd size class (HSC)". The subclasses were as i) 2 or less than 2 animals, ii) from 2 to 6 animals, and iii) more than 6 animals. The collected data were used to study the milk marketing behaviour and depicted in percentage.

RESULTS AND DISCUSSION

Milk sale

The milk disposal pattern in different classes of respondents is shown in table 1. It was observed that in "land owned" class, the % sale of milk was 71, 72, 76 and 64 for landless, small, medium and large farmers, respectively. The high percentage of milk used for home consumption was in larger farmers. Other 3 classes showed sale of major portion (71-76%) of their milk produced (Fig. 1). Bal et al. (1989) reported that only 40% milk was sold in market. But in present study small to medium farmers were selling more than 40% milk in market to generate income. Some workers reported that in "landless" and "small farmers' class more milk was used for home consumption on priority to save the expenditures on food (Gill and Patel, 1983;

MILK SELLER IN THE TOWN OF RANALA, PAKISTAN.

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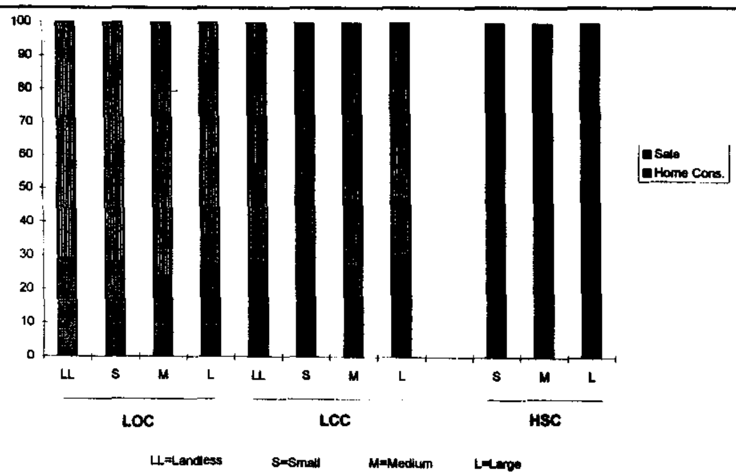

Fig. 1 Milk sale and consumption in different classes (%)

Apte, 1989). In case of large farmers class a substantial percentage of total milk production was used at home. Milk was not only consumed by family members. The workers (Kammi) living with the farmers also get share from it or as matter of prestige and traditions, this class is bound to provide milk to its workers and the poor living nearby. In this group, first priority is given to home requirements and purchase of milk from market for home consumption is not quite palatable. The milk produced is used to make butter, ghee, curd and whey. Most farmers are bound by tradition to make whey and provide nearby poor. Although now traditions are changing but still it will take time to twist the people's attitudes. When data was arranged according the "Herd Size", it showed that farmers having less than 2 animals or more than 6 dairy animals were using maximum milk for home consumption 36 and 42%, respectively (Fig. 1). The minimum percentage of milk used for self-consumption was found in-group having 2-6 animal. The reasons for this trend are self-explaining. This medium group tries to use every mean to generate income. The group having less than 2 animals was forced to use maximum milk production for self consumption. Only the surplus after home consumption is being sold in the market. Similar findings were also reported by Gill and Patel (1983). But in case of owners having more than 6 animals the situation is different. The respondents in this group also own good size of land and good number of farm workers. Therefore, higher portion of milk is used to fulfill domestic, cultural and social requirements and only left over is sold.

REVENUE FROM MILK PRODUCTION

The revenue from sale of milk on average basis was also calculated. These figures only indicate the gross income from sale of milk /day basis. The expenditures are not calculated and subtracted from it to get net income.

The milk was sold at the rate of Rs. 9.50/kg or Rs. 380/40 kg. The revenue from milk was found to be Rs. 64.31, 60.32, 105.16 and 176.17/day for landless, small, medium and large farmers, respectively in land owned class. When revenue from milk was calculated on "herd size" basis it was found to be Rs. 39.23, 97.66 and 183.63/day for small, medium and large dairy herds, respectively.

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Table 1. Milk production and disposal patterns in different classes.

	DAILY MILK PRODUCED (L)	DAILY SOLD (L)	DAILY CONSUMED (RS.)	SALE VALUE (RS.)
Land owned class				
Landless	9.49	6.77	2.72	64.31
Small	8.81	6.35	2.46	60.32
Medium	14.55	11.07	3.48	105.16
Large	29.03	18.60	10.43	176.17
Land cultivated class				
Landless	8.66	6.29	2.39	69.76
Small	7.15	5.22	1.93	49.59
Medium	13.52	9.91	3.61	94.14
Large	30.46	21.46	9.00	203.87
Herd size class				
Small	6.40	4.13	2.27	39.23
Medium	13.50	10.28	3.22	97.66
Large	34.03	19.73	14.26	187.43

CONCLUSIONS AND SUGGESTIONS

It was concluded that small to medium farmers are more dependent on income from milk sale to meet daily expenditures. The major part of their production was marketed. The large farmers were using more milk at home to meet social and cultural demands. The study revealed that there was a big difference between producer (Rs. 9.50/Kg) and consumer prices (Rs.16.0-20.0/Kg). Consumers are forced to pay 60 to 100% more than what producer is receiving.

Suggestions

Following steps are suggested to maximise the small dairy holders income and make dairy farming sustainable enterprise.

1.Minimising the role of middle man

Middle man is purchasing milk at quite low price than what consumer is paying for it. Even Govt. Agencies are paying them equal to the middle man rate. The handling and trasporation costs do not exceed Rs. 0.50 to 1.0/ liter. The maximum profit is going to middle man. In case of Govt. Agencies, heavy overhead charges (staff, equipment, vehicles etc.) consume more of the profit. In both cases producer and consumer are at loss. To make system economical and sustainable, the village dairy associations should operate. The milk from 3-4 villages should be collected at one place, chilled and transported to nearby market. It would be more profitable if farmers would have their own sale points. Few workers from farmers can be hired for this purpose. This practice will minimise overhead charges, save labor and working hours, increase return to producers and ensure supply of quality milk to consumers.

2. To make system functional and self-dependent, Govt. should provide loans either interest free or with minimum markup to purchase milk handling equipment and transportation means.

3. For efficient marketing, road links and infrastructire is necessary. Govt. should provide better links to dairies to increase mareketable milk and to minimise "forced home consumption".

4. Govt. should have a check on milk prices. There should be balance between producer's cost of production and consumers paying price.

5. Attention should also be given to milk that can not be taken to market due to poor trasnporation facilities or over production during flush periods. It can be converted into other dairy products (Cheese, Butter, Ghee) that can be stored and marketed later on.

Buffalo small holder (Rawalpindi, Pakistan.

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PRODUCTIONAL CONSTRAINTS FACED BY SMALL BUFFALO DAIRY FARMERS IN CENTRAL PUNJAB, PAKISTAN

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INTRODUCTION

Livestock sector does not provide only milk, meet, hides, skin etc. but also is a major source of employment, draught power and ready cash security; and contributes a considerable share in GDP (Anon., 1997). The lack of proper health cover and disease control facilities from government sector (according to one estimate of average allocation of funds for the Veterinary health care per animal per year in the province of the Punjab come to 0,06 Rupees only), poor education level, low genetic potentials of animals, old and uneconomical management practices, poor dairy replacement raising systems, use of low grade breeding bulls and scrawny artificial insemination (A.I.)

follows page 13 ☞

services, malnutrition of animals, limited seasonal and poor quality feed resources and their unwise use, lack of new improved technology transfer and inefficient marketing system are the main obstacles that animal owners have to face. Poor credit and marketing facilities, lack of necessary infrastructure, low labor productivity and managerial inefficiencies have a depressing effect on livestock income (Chaudhry et al., 1997). Price fluctuation inherent in livestock sector and lack of livestock based industries are the additional factors depressing the income from this sector. The following study was planned with aims to identify the different constraints that affect the milk production and to devise recommendations and strategies to improve the prevailing situation.

MATERIALS A ND METHODS

Data on different milk production constraints faced by small buffalo dairy farmers in the main milk producing areas of central Punjab were collected through a survey study. 322 farmers were questioned using a pretested form. The respondents were randomly selected using Poete and Daplyn (1993) method. The farmers were categorized in three groups viz.

1. Land owned class (LOC): Sole owner of land
2. Land cultivated class (LOC): and owned plus shared in or shared out.
3. Herd size class (HSC): Classification according to the dairy animals.

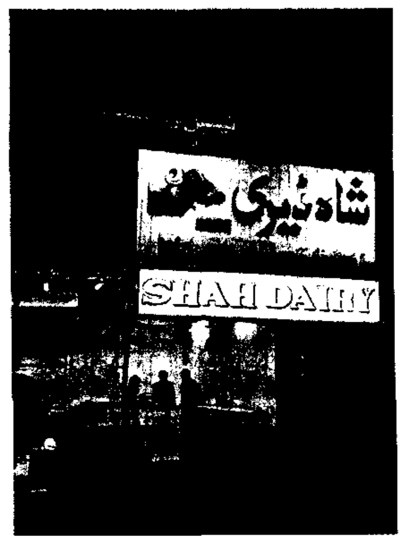
Farmers in categories 1 and 2 were subdivided in following groups viz. I) landless farmers ii) less than 2 acres of land, iii) 2 to 12.5 acres of land and iv) more than 12.5 acres. The respondents in category 3 were further grouped according to the dairy animals owned viz. i) 2 or less than 2 animals, ii) from 2 to 6 animals, and iii) more than 6 animals. The collected data were divided under land, labor, animals, fodder, inputs, health cover, marketing, equipment, credits and other miscellaneous constraints that directly affected milk production. Respondents in each constraint category out of the total were shown in percentage. The structural composition of each constraint was also worked out and was depicted in percentage of respondents under each constraint.

RESULTS AND DISCUSSION

Constraints affecting milk production

Distribution of data according to farm and dairy holding size helped in understanding the magnitude of different constraints and behavior of respondents. The percentage of respondents was expressed under different constraints related with land,

follows page 14 ☞



DAIRY SHOPS (RAWALPINDI, PAKISTAN)

Table 1: Different constraints (%) faced by respondents in LOC

	Land	Animals	Labour	Fodder	Input	Dis/Vet. services	Marketing	Tractor/ Shed	Credit	Miscel
Land Owned Class (%)										
Landless	18	1	2	28	3	15	1	1	28	4
Small	23	0	5	16	4	18	0	4	25	7
Medium	17	2	8	14	13	19	6	5	14	2
Large	12	0	7	13	15	27	2	7	13	5
Land Cultivated Class (%)										
Landless	18	0	4	29	4	12	0	1	28	4
Small	29	0	5	24	3	10	0	2	22	5
Medium	17	2	5	16	10	19	4	3	20	3
Large	7	0	7	9	16	36	5	10	5	5
Herd Side Class (%)										
Small	19	1	3	22	6	12	1	2	28	4
Medium	17	1	9	16	10	21	3	4	16	4
Large	14	0	3	18	11	31	6	6	8	3

animals, labor, inputs, fodder, disease control, milk marketing, farm building, financial and miscellaneous pertaining to family, water logging and drinking water shortage (Table 1). The importance and significance of problems was different in different groups. For landless (18%) and small farmers (23%) land was the major constraint. They want to have land/more land to run their agricultural and dairy activities more efficiently. 28% farmers were facing the problems with fodder production and credit facilities. Finance (14%), disease (195), inputs (13%), fodder (14%) and marketing constraints (16%) were more important for medium farmers. Financial, disease control and fodder production constraints gain substantial weight in all the groups (Tabe 1). Milk marketing was the major problem of medium class of farmers. In LOC and LCC, medium producers were the most concerned about marketing of their milk and allied problems. Whilst in HSC, large farmers were unsatisfied with the prevailing marketing situation (Table 1).

The data were also manipulated to find the impact of individual constraints on different groups of animals (Table 2). The structural composition of different constraints showed that problems of animal feeding were on top in case of landless (40%) and medium farmers (32%) whilst minimum (10%) in large farmers. By studying Table 2, it is obvious that medium class is facing most of the problems; and impact of different constraints is substantial to this class. This class is the backbone of our agriculture economy and the most conscious about the improvement in farm productivity and income. This class is having limited land and limited number of animals; and with meager resources wishes to maintain social status in our society through increase in production per unit basis (crops or animals). This is why it has shown the maximum concern in identifying the constraints (Pandy, 1988; Gryseels, 1988; Apte, 1989; Bhatti et al. 1989; Bhende and Venkataram, 1994). The collected data was also analysis based on "herd size" grouping to find out the problems related with animal keeping. The fodder production, land and credit facilities were found the major problems in small holding class. In case of medium herds class, land, fodder, vet. cover, credit facilities and in large herd class fodder and vet. cover were of main concerns. The structural composition of individual constraints revealed that land constraint was hitting 54% small herd owners. The small and medium herd owners were being affected by the different constraints. The biggest constraints for large farmers were milk marketing and vet. cover (Table 2).

The preview of different constraints suggests that fodder production was the biggest constraints in all groups; especially for landless, small and medium farmers. The inefficient marketing system was also pointed out by many groups of farmers, particularly large herd owners. Marketing directly influences the success of any enterprise, other wise they could have better way, the high cost inputs and poor return has been criticized by many workers (Bhatti et al., 1989; Amtmann and Olivares; 1990; Rao et al., 1991; Goswami and Rao 1992; Deoghare and Bhattacharyya, 1994). The disease control and vet. cover was also highlighted as an important constraint. There is need to launch credit facilities under a foolproof system. The "one window" and "one agency" credit facilities should be available to all class of farmers; especially to small and medium farmers and it should e made sure that credit is being dispensed to right candidate and utilized at right place. It was observed that if constraints pertaining to finance, resources (inputs) and marketing could be removed, farmers even with poor education and training can increase their dairy production and net income (Natraju and Channegowda, 1987; Rao, 1988; Singh and Singh, 1988; Natraju,

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Table 2. Structural composition (%) of different constraints.

	Land	Animals	Labour	Fodder	Input	Dis/Vet. services	Marketing	Tractor/ Shed	Credit	Miscel
Land Owned Class (%)										
Landless	40	33	14	55	15	31	10	14	52	28
Small	18	0	14	11	6	14	0	14	17	25
Medium	32	67	52	24	52	34	80	43	21	19
Large	10	0	19	10	27	22	10	29	10	19
Land Cultivated Class (%)										
Landless	29	0	24	41	12	19	0	7	38	25
Small	24	0	14	18	6	8	0	7	16	19
Medium	42	100	43	35	55	45	70	43	43	38
Large	6	0	19	6	27	28	30	43	4	19
Herd Side Class (%)										
Small	55	67	33	57	37	34	20	36	68	56
Medium	31	33	57	27	39	36	40	36	25	31
Large	14	0	10	16	24	30	40	28	07	13

1989; Gowsawami and Rao, 1992). The single dairy animal is another limiting factor in milk production. When one buffalo goes dry, farmers have to feed her during dry period till the next calving (Rao, 1980). It increases the cost of milk production and makes the dairy farming discouraging and profit losing business. The dairy business should start at least with two good dairy animals (Rao, 1980), if one goes dry, other animal could keep the business running. The best-suggested and most economical viable dairy unit is 4-6 dairy animals (Bhende and Vankataran, 1994). The keeping of dairy cattle along with buffalo is good proposition. The mixed farming can produce milk around the year due to different seasons of their calving.

MILK CONTAINERS TO DRY UP (OKARA, PAKISTAN).

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TECHNICAL NOTE ON BUFFALO SEMEN

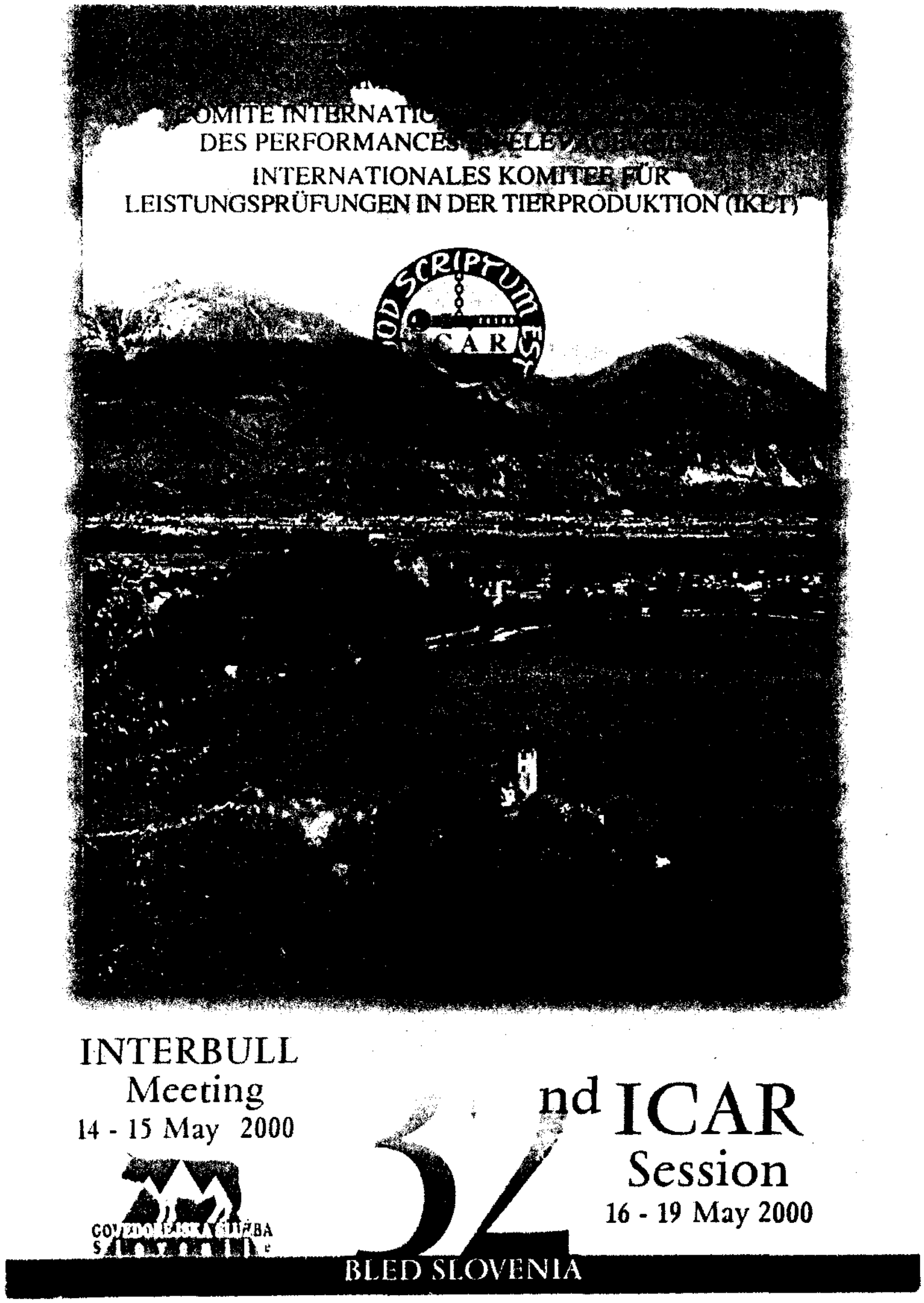
B.R. Benjamin

XV/441, Victoria peta Extensio, Adoni-518 301, India.

A buffalo bull donates about 2.85 ml of semen per ejaculate (seldom up to 4 ml) in contrast with cattle which can donate 5 to 10 ml. Sperm concentration in very variable: 1,234.9 +/- 43.1 million sperms/ml in the Murrah breed, as well as initial motility which varies from 75 to 85%. The above mentioned values depend essentially on the precoital sexual excitement at the moment of the ejaculatory thrust. The number of false mounts, age, season, frequency of collection, diet and fitness (i.e. exercise) also affect the above parameters. Buffalo semen exhibits anabiosis phenomena, i.e. sperms seem dead at the time of ejaculation, especially in Northern India during Winter, but motility can be revived when the sperms come in contact with buffers containing citric acid or the usual extender, or even by gentle warming. In the past, usually, the semen with no initial sperm motility was discarded, but now it is used after dilution with an extender. It is suggested that this semen be used only fresh and never frozen. It is not known whether initial sperm motility is a heritable trait.

Buffalo semen resists to cold schock better than cattle semen, however, it seems that under deep freezing buffalo semen can last less than cattle semen (maximum one year). Unhygienic handling of buffalo semen has made many farmer in India reluctant to use AI. Tris-milk based dilutors are certainly better that the traditional egg yolk based extenders as the addition of yolk over 20% does not enhance cryoprotection and the increased viscosity lessens the forward motility in the cervix. The lipoprotin of egg-yolk could be antigenic and produce local antibodies in the female genital tract (uterine submucosa) and may lead to an artificially induced sterility in females. The antibody formation (against yolk proteins) must be still critically studied.

The practice of using cattle artificial vagina with the cone for collecting buffalo semen should be discouraged because a considerable amount of semen is unnecessarily lost.


DES PERFORMANCES
INTERNATIONALES KOMITEE FÜR
LEISTUNGSPRÜFUNGEN IN DER TIERPRODUKTION
INTERBULL
Meeting
14 - 15 May 2000
32nd ICAR
Session
16 - 19 May 2000
BLED SLOVENIA

FAO-ICAR BUFFALO WORKSHOP (MAY 2000)

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 session, 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 to draft recommendations.

The Workshop will be participated by 20 countries where buffalo is reared: Italy, Bulgaria, Romania, Greece, Macedonia, Albania, Turkey, Armenia, Azerbaijan, Iran, Iraq, Syria, Egypt, Pakistan, India, Sri Lanka, Nepal, China, Thailand and the Philippines. Several international projects are being carried out in many of these countries to improve buffalo milk production through recording, selection and breeding strategies. It will be a unique opportunity for the people involved in buffalo development, for buffalo experts and buffalo development policy makers to discuss buffalo breeding strategies at international level.

ICAR and INTERBULL, through their activities, have contributed in the past to the progress of the major cattle breeds all over the world. They have supported the standardization of animal recording internationally as well as the Multi-Country Genetic Evaluation of dairy bulls.

It is time now for the buffalo people to wake up and to take buffalo questions out of their own country. Buffalo was the neglected livestock in the Second Millenium. It will become the livestock of the Third Millenium. The Buffalo Workshop gives you the opportunity to meet. Do participate in this event.

If you are interested, do please contact the Coordination Centre of the Network or directly ICAR, via Nomentana 134, 00162 Roma, <j.boyazoglu@rmnet.it>.

BUFFALO RESEARCH IN THE WORLD

In this section of the Buffalo newsletter all buffalo scientists are invited to present their research institution and ongoing research projects.

1. Name of the institution:
Veterinary Research Institute NWFP, P.O.Box 367, Peshawar, Pakistan.

2. No. of researchers involved in buffalo research: **34**

3. Title of recently concluded projects:
Hides and Skins Project
National Coordinated Buffalo Research Program
Herd Health Program

4. Title of ongoing projects:
Introduction of biotechnology in animal health and reproduction
Chief Minister's Livestock Improvement Program

5. Name of journals where the research results are published:
Asian-Australasian Journal of Animal Sciences (Korea)
Proceedings of the National Science Council (R.O. China)
Pakistan Veterinary Journal (Pakistan)
Egyptian Journal of Dairy Science (Egypt)
Buffalo Journal (Thailand)

6. If there is an experimental station at the Institute, how many buffaloes are there, who takes care of them, etc.
Private buffalo farms around Peshawar City (having about 2000 buffaloes) are used for research purpose. The owners of the farms take care of the animals and technical support is provided by the Institute scientists.

7. Research goals for the future:
Improvement in reproductive performance and calf survival rate
Reduction in expenditures through feeding management
Improvement of health status through control of diseases
Increase in average milk production
Integrated approach of technical, financial and marketing support

8. Importance of buffalo farming in the region:
Pakistan-Indian subcontinent is known for having the best dairy buffalo breeds of the world, namely, Nili-Ravi and Murrah. In Pakistan buffalo contributes 70% milk and 50% meat production. Annual growth rate of the species was 4.7%, which is the highest during the last decade, in the world. Pakistani Nili-Ravi buffalo contributes 10% of the world buffalo population, while it produces 22% of the total milk of the world. Buffalo milk is preferred in the region because of higher fat contents (8%) as compared to cow's (3.5%).

9. Cooperation projects of the University with the local buffalo farmer of the region.
Establishment of Dairy Development Network
Improvement of A.I.Technology in Dairy Buffaloes in the NWFP

Information sent by:

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WORKING GROUP - RECORDING AND GENETIC RESOURCES

The FAO Buffalo Research Network has established a new Working Group on buffalo recording and genetic resources. We remind the readers that the three already existing Working Groups cover the following fields: reproduction, products and livestock systems.

OBJECTIVES OF THE WORKING GROUP

The new Working Group has the aim to promote animal recording systems in buffalo world wide. It supports the activities of the WG on Buffalo Recording established within the International Committee on Animal Recording (ICAR). The Working Group is organizing a joint workshop on "Animal recording for Improved Breeding and Management Strategies of Buffaloes" in May 2000 during the 32nd ICAR Session in Bled, Slovenia.
The objectives of the Group include also comparative studies of genetic diversity of buffalo. The group carries out a bilateral project (Greece and Italy) on animal genetic diversity in buffaloes. Egypt has recently agreed to participate in this project.

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THE BULGARIAN BUFFALO CONFERENCE

was held at Razgrad (North Bulgaria) from 3rd to 5th September 1999, organized by Prof. Dr. Aleko Alexiev, Buffalo Research Institute, 9700 Shoumen, Bulgaria, tel/fax 35954 62872. Seventy participants including scientists and buffalo breeders from Bulgaria took part in the conference which was carried out during the national buffalo exhibition.

The following scientific papers were presented:

1.Creation of the buffalo breed "Bulgarian Murrah" (A. Alexiev)
2.Level of some technogene radionucleids in the milk of different species of productive animals (S. Boikovski and M. Tzankova)
3.Reproductive peculiarities in buffalo (A. Danev)
4.Seasonal changes in the hide, sweat and oil-glands in the local buffalo and in the Murrah breed (C. Dragnev)
5.Buffalo in the Bulgarian spirituality (G. Zdravkov)
6.Sources of specific effects on the age at first calving in buffalo (T. Peeva)
7.Influence of selenium in the cryoresistance of the spermatozoa from buffalo bulls (C. Viseberg and S. Kolev)
8.Digestion of rations with different quantity of urea in the composition of concentrates in weaned calves (M. Tzankova)
9.Technological parameters in raising different categories of buffaloes (M. Tzankova)
10.Content of vitamin B12 in the rumen of buffalo calves (K. Sivkova and M. Tzankova).

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