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BUFFALO RECORDING

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INTRODUCTION

Animal recording is a prerequisite for any serious effort to develop livestock production at both farm and industry level. The International Committee for Animal Recording (ICAR) [1] is a non-governmental, non-profit organization concerned in the progressing of animal recording world-wide on solid scientific and technical basis and in collaboration with other institutions. Members of ICAR are the recording organizations of any country wishing to adopt and implement standardised methods for animal recording. The main components of animal recording operation system are:

1. Identification of the animal by applying a plastic eartag with a numbar which is readable from distance.

2. Collection of information on birth, age, reproduction, lactation, AI, pregnancy, calving.

3. Collection of information on newborn.

4. Visit of a technician once a month and record of the traits (milk, body weight, milk sample for somatic cells or quality...).

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

6. Produce genetic evaluation .

Organized animal recording has been practiced for long in most developed countries and demostrated that the productivity of animals can be increased through development of recording systems. Data collected in these systems can be used for estimation of Breeding Values, selection of bulls and bull mothers, extension services (feeding requirements, reproductive patterns, pathologies) and once entered in a national database they are a good tool for undestanding the production systems and can contribute to making national strategies for livestock development. The services supplied by the recording organizations have been constantly improved through adoption of international measures for quality control. It is worldwide recognized that animal recording was indeed the basis for the realised genetic improvement of dairy cattle. However, buffalo recording at world level is very little developed because buffalo are reared mainly in developing countries where animal recording has to face many constraints.

CONSTITUTION OF A WORKING GROUP ON BUFFALO RECORDING WITHIN ICAR

The group coordinated by B. Moioli (Italy) was officially established during the 30th ICAR session (Holland, 1996) and was composed of people from research and recording organizations of India, Pakistan, Bulgaria, Egypt and Italy. A draft of an International Agreement for the recording of milk performances in buffalo was submitted to the Board and published in the Buffalo newsletter no. 5, page 5. During the 29th ICAR session, the coordinator of the group had been charged by the President of ICAR to lead a survey on buffalo recording all over the world. The results of the survey were presented in the 30th ICAR session and indicated that although only 7 countries have an organized recording system, 16 more could be interested in this activity.

WHY ANIMAL RECORDING?

Recording the identification of animals that enter the human food chain is of fundamental importance

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because the movement of animals, germplasm and food products continues to grow both at national and international level. Four main areas were identified by G.A.Doak (in "Performance recording of Animals, State of the art, 1998", EAAP Publ. no. 91, p.41) where the unique identification of an animal with a lifetime number that is compatible between countries is a worthy goal to pursue: 1. for health and food safety it is necessary to the veterinary authorities to have a national identification database allowing them to investigate the life cycle of an animal found to have a disease at slaughter; 2. for management decision; 3. for performance recording; 4. for breed improvement and genetic conservation purposes.

HOW TO SPREAD OUT ANIMAL RECORDING IN DEVELOPING COUNTRIES

FAO, sustaining the idea of assisting countries in developing and better managing their genetic resources which requires appropriate recording systems, has supported ICAR in the organization of an **International Workshop on Animal Recording for Smallholders in Developing Countries**. The Workshop was held at the National Dairy Development Board of Anand (India) in October 1997 and attended by experts from more than 25 countries (see Buffalo newsletter no. 8, December 1997). **Proceedings of the Workshop** edited by K.R. Trivedi are available on request.
The constraints to the establishment of a sustainable recording system and proposals to overtake them were suggested and will be here briefly considered.

PURPOSE OF ANIMAL RECORDING

Several developing countries have established a national organized recording system the purpose of which was in all cases the estimation of Breeding Values from milk recording data; herd management service can be a second purpose in some cases, but consists more in supply of semen, AI, supply of concentrates, pregnancy diagnosis and health care more than in sending information.
It was strongly emphasised that the purpose of the recording system must be clear in the context of a well defined livestock improvement program.
Some people stated that priority must be given to initiate performance recording with a view of achieving genetic progress in the population.
Some countries, like Malaysia, have assisted to an accentuated abandoning of ruminant farming being labour intensive with no corresponding monetary return, while increased urbanisation offers better job opportunities. Increasing productivity, particularly in the ruminant sector, is a big challenge which might keep farmers in the country and animal recording could be the preliminary step towards this process.
Increased milk consumption was observed in countries where cow milk was not popular at all up to 20 years ago (Indonesia, Thailand, China, Sri Lanka) due to the nutritional awareness of the communities and of people movement (immigration, tourism). Milk recording systems in these countries might give an important contribution to the dairy industry.
Governments should realise how important will be an integrated information system paying attention to all aspects of animal production, recording namely: 1. exploitation of forages in the territories; 2.mating period and birth of young; 3. pathologies of the herds; 4. marketing of the products (J.C. Flamant, in "International Workshop on Animal Recording for Smallholders in Developing Countries", ICAR Techn. Series no. 1, 1998, p.267).
Data from animal recording will supply a picture of the animal genetic resources of a defined territory and allow the identification of the endangered ones.

FACED CONSTRAINTS

Some people argue that the benefits derived from recording systems are very marginal and not worth to put the efforts they need; some other people question the utility of information to smallholders who have only two or three cows (K.R. Trivedi, in "International Workshop on Animal Recording for Smallholders in Developing Countries", ICAR Techn. Series no. 1, 1998, p.5). But this relates only to personal/short-term utility; in fact, a few organizations in developing countries have demostrated that established recording systems have lead to increase productivity and have provided valuable data for national livestock development strategies.
To convince small farmers to keep records of their animal performances when their animals do not give them adequate return is a hard job. In the breeding improvement program run in Gujarat (India) farmers were convinced to participate in the milk recording activity by supplying them 350 kg concentrates during two years for each calf born within the progeny testing program and supplying AI at 1/3 of the actual cost.
Another incentive could be to show the farmers data on increase of milk yield obtained from milk recording; moreover, if milk yield sheet reports with the results of the records are published at village level, farmers would be stimulated to compare their yield with their neighbours.
Another incentive could be to make them to join an AI program together with the recording system, describing through meetings and visits the deriving advantages.
A considerable constraint to overtake is to find the most apt organization in each ountry taking charge of the establishment and supervision of the recording system. It was suggested during the Workshop that this organization must at least carry out the genetic evaluation from the recorded data.

FINANCING

The most critical issue is stable funding because genetic improvement is slow and expensive. Therefore

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policy makers must be convinced of its efficiency in order to commit resources for these programs on a sustainable basis.
In the recording programs presented as successful at the Anand Workshop, farmers did not pay for the service. It is important that at least at the beginning the farmers do not pay for the recording activity. When they find that the received services are important, they would pay it and this will ensure long-term sustainability.
The recording systems presented in the Workshop were provided either by profit organizations (milk producers/processors, cooperative industries, like in Gujarat and Zimbabwe) or by internationally funded projects (Swiss, German, Canadian, Swedish, Italian, in Andhra Pradesh, Maharashtra, Sri Lanka, Venezuela, Turkey).

Milking parlour at the Italian buffalo research farm.

ROLE OF ICAR-FAO IN IMPLEMENTING ANIMAL RECORDING SYSTEMS

The two organizations are available to: 1. provide standards and guidelines; 2. provide training and consultants; 3. organize networks and workshops; 4. contribute to the participation of people from developing countries to ICAR and INTERBULL meetings.

PROPOSALS FOR ACTIONS IN THE BUFFALO NETWORK

We believe that the results of the Anand Workshop should be the starting point for an active participation of the memebr countries of the Buffalo Network in the ICAR WG on buffalo recording.
The following table indicates the state of art of buffalo milk recording, ICAR membership and Buffalo Network.
Meditating on the above table you will easily agree on how fruitful will be for the Buffalo Network to propose actions within the ICAR WG on buffalo recording, the final goal of which will be to establish sustainable recording systems for buffaloes in the countries where they are not in course and to have all of them participating in the ICAR activities. It must be never forgot that standardisation of milk recording methods is indeed the basis for the exchange of semen and breeding stock among countries. Moreover, it must be considered that ICAR WGs work in close link with INTERBULL, the International Bull Evaluation Service (see Buffalo newsletter no. 9, page 14) task of which is the improvement of the international comparison of bulls of dairy breeds all over the world.
A preliminary step by step proposal could be the following:
1. For the countries in both column 1 and 3: give the start to a multi-country pilot project, as the one discussed at the Board meeting in Caserta (Oct. 1997) having the long-term purpose to evaluate the genetic merit for milk of buffalo bulls of different breeds and lines. The running of the project will require a well established and supervised recording system and will also demonstrate in the short-term the economic benefits of buffalo milk recording to the countries which are not in column 1.
2. Countries in column 1 will set up discussion groups in order to harmonise buffalo recording systems with the medium-term goal to get the ICAR membership for all of them.
3. Countries in column 2 will work with the ones in column 3 but not in 1 in order to prepare a document on the constraints in each country against the establishment of buffalo recording systems. They will also discuss and draft recommendations on the ways in which recording programs could be established and sustained in their country.
We invite all people who are really interested in participating in the ICAR WG - "really" means that they want to work on this subject and that they have proposals to make - to contact the coordination centre of the Buffalo Network. Thank you in advance. ●

BUFFALO RECORDING	ICAR MEMBERSHIP	BUFFALO NETWORK (Europe-Near East)
Italy	Italy	Italy
Bulgaria	Bulgaria	Bulgaria
Romania	Romania	Romania
Egypt		Egypt
Iran		Iran
	Greece	Greece
		Turkey
		Iraq
		Azerbaijan
		Syria
Gujarat (India)	Gujarat (India)	
Kerala (India)		
Pakistan		

harvested fields as well as canal and road sides, where only little fodder is available. In addition to green fodder and straw, most households feed concentrates, the most important being cotton seed cake. Other concentrates used were wheat grain or flour, wheat bran and raw sugar. In fodder shortage times the most important feeds were wheat straw (279 households), wheat grains (154), cotton seed cake (117) and grass (93).

The household size reflects the traditional joint family system, under which several generations live together. Literacy is still low. About half of the households are without literate adults. However, 56 % of all children, including those too young, are going to school.

73 % of the households were able to estimate the proportion of income achieved through farming and livestock activities out of their total household income. The mean of 87% indicates the overriding importance of agriculture. However, in 43% of all households at least one member is engaged in non-farm activities.

Results of the detailed investigation into household objectives of keeping dairy animals are not available yet. Respondents asked why they were keeping buffaloes or cows gave reasons as presented in table 2.

Table 2: Opinions on keeping buffaloes or cows

The two most common reasons for		(n)	% of valid answers
keeping buffaloes:	Higher milk yield	(48)	23 %
	Milk has more fat / milk is thicker	(31)	15 %
keeping cows:	We like both	(17)	9 %
	Calf can become bullock	(14)	4 %

These figures indicate that despite many efforts to promote dairy cattle, buffaloes are still regarded as superior by the majority of village milk producers. Although exotic semen has been imported to Pakistan for a long time, 66 % of all cow keeping households kept non-descript cows. Only in very few cases did farmers indicate the intention of intensifying milk production through acquiring improved cows.

In a previous study difficulties in obtaining reliable information on livestock mortalities through interviews emerged; mainly because of the limited number of animals per household. Therefore, instead of asking for the number of deaths during the last year, allowing the calculation of mortality rates, the date of the last death was asked for, see table 3. Even so, respondents often refused to remember any mortalities at all. In one instance, one of the enumerators was actually accused of indecency by an old women, because of enquiring about animal deaths.
Theoretically it may be possible to estimate mortality rates from the period since the last death. But the fact that the age of young animals at the time of death was much lower than the time since when it occurred means that the actual time during which the animal was at risk can hardly be

Table 3: Mortality.

	time since last death [m] (n)		mean age at last death (n)		most important mortality cause (n)		% of valid answers
buff. adult female	37.7	(169)	2.7 lact.	(166)	HS[1]	(79)	51%
buff. young female	23.2	(194)	16.1 m	(191)	HS	(119)	66%
buff. young male	36.2	(180)	9.5 m	(180)	HS	(85)	53%
cattle adult female	15.2	(3)	4.7 lact.	(3)	Sudden death	(2)	67%
cattle young female	24.9	(6)	24.0 m	(7)	HS	(3)	50%
cattle young male	21.3	(10)	16.1 m	(12)	HS	(4)	44%

[1] HS: haemorrhagic septicaemia.

calculated. Furthermore, cattle deaths were hardly reported at all. Therefore, mortality rates will have to be established by the milk production survey. The fact that the most important cause of death is haemorrhagic septicaemia (HS) is surprising, since 92 % of all households reported to vaccinate against this disease. Even though this proportion may be exagerated (farmers might like to appear progressive) the result does cast serious doubts on the effectiveness of the vaccine or the vaccination procedure (or the identification of the death cause). Average lactation data of buffaloes and cows are

Table 4: Milk production parameters by village location: buffaloes.

		total	society area		near to river		near to road	
			yes	no	yes	no	yes	no
no. of adult	mean	4.0	3.9	4.1	4.3	3.7	3.9	4.3
female buffaloes	s.e.	0.33	0.55	0.41	0.42	0.52	0.42	0.54
per household	median	2	2	2	2	2	2	2
	(n_1)[1]	(310)	(139)	(171)	(159)	(151)	(201)	(109)
maximum milk	mean	8.0	7.2	8.7	8.4	7.6	8.2	7.7
yield per day[2]	s.e.	0.10	0.12	0.14	0.15	0.12	0.13	0.15
[kg/d]	median	7.3	6.9	7.7	7.6	7.2	7.6	7.3
	(n_2)[1]	(1244)	(540)	(704)	(689)	(555)	(773)	(471)
lactation length [m]	mean	9.5	9.7	9.4	9.9	9.1	9.5	9.5
	s.e.	0.07	0.09	0.09	0.09	0.09	0.08	0.12
	median	9	9.5	8.5	9	9	9	9
	(n_2)	(1175)	(504)	(671)	(649)	(526)	(728)	(447)
months open[3] [m]	mean	5.1	4.8	5.3	5.8	4.5	4.8	5.5
	s.e.	0.09	0.13	0.13	0.13	0.12	0.11	0.15
	median	4	4	4.5	4.5	4	4	4.5
	(n_2)	(1150)	(482)	(668)	(636)	(514)	(703)	(447)
average annual	mean	1635	1719	1579	1634	1636	1714	1527
milk yield[4] [kg/y]	s.e.	16.3	28.0	19.4	22.8	23.0	19.2	27.5
	median	1588	1753	1502	1536	1710	1753	1438
	(n_2)	(993)	(397)	(596)	(553)	(440)	(575)	(418)

[1] (n_1): number of households, (n2): number of animals
[2] "maximum milk yield per day" is calculated by averaging the maximum yields of best and worst dairy animals per household and then weighting by the number of dairy animals per household.
[3] "months open" is the period between parturition and next conception.
[4] "Average annual milk yield" is calculated by correcting the lactation yield by the inter-calving period (months open + gestation period). The lactation yield is calculated by multiplying 50 % of the maximum yield per day, assumed to be the average daily yield, by the lactation length.

presented in tables 4 and 5 respectively. Average annual milk yields were calculated for each household as a measure of milk production intensity, since it combines milk yield with reproductive efficiency. The results are clustered for village location.

It is obvious that the village location has only limited impact on the intensity of milk production.

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Table 5: Milk production parameters by village location: cattle.

		total	society area		near to river		near to road	
			yes	no	yes	no	yes	no
no. of adult	mean	1.8	2.1	1.6	1.7	2.1	1.9	1.7
female cattle	s.e.	0.19	0.38	0.16	0.16	0.50	0.27	0.24
per household	median	1	1	1	1	1	1	1
	(n_1)[1]	(99)	(44)	(55)	(68)	(31)	(63)	(36)
maximum milk	mean	6.5	6.6	6.4	6.7	6.1	6.8	6.0
yield per day[2]	s.e.	0.28	0.46	0.33	0.34	0.44	0.38	0.36
[kg/d]	median	5.7	5.7	6.0	6.1	5.3	6.1	4.5
	(n_2)[1]	(143)	(65)	(78)	(102)	(41)	(92)	(51)
lactation length [m]	mean	8.4	9.4	7.6	8.2	8.9	8.8	7.7
	s.e.	0.23	0.32	0.31	0.25	0.52	0.31	0.32
	median	8	8.5	7.5	8	8.5	8	8
	(n_2)	(127)	(56)	(71)	(91)	(36)	(80)	(47)
months open[3] [m]	mean	5.6	6.3	4.9	5.1	6.6	5.5	5.7
	s.e.	0.28	0.50	0.30	0.27	0.71	0.37	0.44
	median	5	5	4.25	5	5	5	5
	(n_2)	(125)	(57)	(68)	(89)	(36)	(81)	(44)
average annual	mean	1064	1236	918	1026	1160	1116	977
milk yield[4] [kg/a]	s.e.	48.9	84.7	47.8	46.2	126.9	63.8	74.2
	median	1020	1087	906	935	1045	1045	924
	(n_2)	(113)	(52)	(61)	(81)	(32)	(71)	(42)

For footnotes see table 4.

Surprisingly, maximum buffalo milk yields are lower in the area of the society. But calving intervals are shorter and lactations are longer, resulting in higher annual yields. Thus, impact of the society's work seems to be greatest on buffalo fertility. The results regarding the riverine areas are contrary to common belief, that these areas are superior in milk production. However, the situation may appear different, once economic measures are calculated. In these areas, fodder costs are far lower, due to the greater availability of grazing land.

The following analysis is confined to milk production with buffaloes, because only 31% of the surveyed households were keeping cows. To limit the distorting effect of the few very large farms, households keeping 12 or more adult female buffaloes or owning or cultivating 30 or more acres (the 95% cut-off points) are not considered for further analysis. Thus, 284 households remain for further analysis. Furthermore, milk yield in the following tables is the herd, not animal average, as at this stage the object is the household rather than the individual animal.

To assess the impact of parametric household variables, households for which lactation data were available were ranked by average annual milk yield. Subsequently, the top 25% were compared with the bottom 25%. Table 6 shows the result of this comparison with the significance of differences of means indicated by the error probability p=0.05 or less indicating a significant difference. The influence of categoric variables was studied by comparing average annual milk yields of the respective categories, as shown in table 7.

The results of tables 6 land 7 allow an assessment of the influence of the tested household variables. As indicated in tables 4 and 5, the village location has little influence. Only road access shows a distinct though not significant impact. Obviously, household size has no influence on the intensity of milk production. Also, the number of months per year, during which the animals are grazed has little impact. The sale of milk, the fact that cotton seed cake is fed at all as well as the vaccination of dairy animals cannot be regarded as potential selection criteria, as all three are very common. The development contributions of the society are difficult to assess on the basis of these figures. However, it does emerge, that those households with more resources tend to have higher milk yields. They own and cultivate more land and also have more animals, although the differences in cultivated land, total buffaloes and adult female buffaloes are not significant. In addition, those households show higher yields which have fewer non-farm jobs and a higher percentage of farming income out of total income. Therefore, households, for which farming is the only or major source of income, produce milk with a higher intensity.

However, it does seem worrying that these

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Table 6: Influence of parametric household variables on buffalo milk yield (top and bottom household quartiles, ranked by average annual milk yield).

	top 25 %		bottom 25 %		p
	mean	(n)[1]	mean	(n)	
average annual milk yield [kg/y]	2161	(46)	870	(46)	0.00
land owned [acre]	5.6	(46)	3.1	(46)	0.04
land self cultivated [acre]	6.8	(46)	4.8	(46)	0.08
no. of buffaloes	6.7	(46)	5.9	(46)	0.37
no. of adult female buffaloes	3.1	(46)	2.5	(46)	0.16
months grazing per year [m/y]	4.0	(46)	4.1	(46)	0.88
cotton seed cake per buffalo [kg/y]	418	(46)	236	(46)	0.02
farm income of total income[2] [%]	93	(33)	76	(28)	0.02
no. of non farm jobs per household	0.6	(46)	1.0	(46)	0.02
no. of persons per household	8.8	(46)	9.3	(46)	0.59
no. of literate adults per household	0.7	(46)	1.3	(46)	0.03

[1] Out of 284 households with less than 12 adult female buffaloes and less than 30 acres of self-cultivated or owned land, it was possible to calculate valid average annual milk yields for 186.

[2] Only 131 respondents were able to estimate the share of income through farming and livestock.

Table 7: Influence of categoric household variables on buffalo milk yield (kg milk/y).

	yes	(n)	no	(n)	p
in society area	1514	(74)	1475	(111)	0.62
near river	1497	(94)	1484	(91)	0.87
near road	1544	(115)	1403	(70)	0.07
owning land	1516	(117)	1444	(68)	0.35
cultivating land	1499	(138)	1467	(47)	0.75
knowledge of society	1506	(81)	1477	(104)	0.68
member of society	1433	(39)	1506	(146)	0.37
selling milk	1513	(175)	1104	(10)	0.01
feeding cotton seed cake	1514	(161)	1339	(23)	0.23
vaccinating dairy animals	1514	(166)	1287	(19)	0.05
main income: farming	1500	(131)	1461	(53)	0.67
having bank account	1508	(51)	1446	(134)	0.07

households, which are more engaged in farming, have a distinctly lower literacy rate.

A relationship of milk yield with the amount of cotton seed cake fed per year as well as per day is evident. This seems logical and is a good indicator of the intensity of the production process. The differences between households having a bank account and those without are quite substantial, though not significant. They may indicate, that a certain economic prosperity, for which a bank account stands as proxy, might be linked to the ability of purchasing cotton seed cake.

Thus it appears that two variables are most closely related with the intensity of milk production: household resource endowment as described by acreage and cotton seed cake fed. In order to asses how far these two criteria would be suitable for classifying the sample into selection categories for the milk production survey, household classes are formed by dividing at 2 kg cotton seed cake per day and 2 acres of owned land. These values represent the rounded median after exclusion of the very large farms. Table 8 shows the distribution of households within the proposed selection classes.

Table 8: Distribution of households within the proposed selection classes.

	CSC / d < 2 kg		CSC / d >= 2 kg	
	%	(n)	%	(n)
land owned < 2 acres	19%	(54)	31%	(88)
land owned >= 2 acres	15%	(41)	35%	(99)

In order to assess the meaningfulness of these classes, they are compared by various descriptors. The results of this comparison are given in table 9.

Table 9: Descriptors of proposed households selection classes.

		land[1] < 2 acr. CSC[2] < 2 kg/d		land < 2 acr. CSC >=2 kg/d		land >= 2 acr. CSC < 2 kg/d		land >= 2 acr. CSC >=2 kg/d	
CSC / d	[kg/d]	0.5	(54)[3]	2.4	(88)	0.6	(41)	2.7	(99)
CSC / y	[kg/y]	44	(54)	328	(88)	74	(41)	429	(98)
land owned	[acres]	0.2	(54)	0.2	(88)	7.4	(41)	8.3	(99)
land cultivated	[acres]	1.9	(54)	2.4	(88)	8.2	(41)	7.6	(99)
no. of buffaloes		3.4	(54)	4.7	(88)	7.1	(41)	8.4	(99)
no. of ad. fem. buffaloes		1.6	(54)	2.1	(88)	3.0	(41)	3.7	(99)
av. ann. milk yield	[kg/y]	1352	(25)	1513	(61)	1343	(28)	1583	(70)
no. of non-farm jobs		1.3	(54)	1.0	(88)	0.3	(41)	0.5	(99)
% farm income of total	[%]	74	(27)	80	(55)	92	(35)	91	(82)

[1] "land": owned land [2] "CSC": cotton seed cake [3] (n): number of households

It is reassuring, that the class with more land and more cotton seed cake shows the highest average milk yield. However, the fact that the class with more land and less cotton seed cake has the lowest average milk yield indicates, that perhaps owned land is not the optimal variable for forming selection classes, although previous results had indicated a strong influence. The classification by non-farm employment might be an option, as it shows an equally strong influence. It is also logically connected to milk production, as for households with non-farm employment the subsistence aspect would be more prominent. However, this criterion would be subject to a greater fluctuation over time.

CONCLUSIONS AND OUTLOOK

The results of the first survey show that although the sale of milk is widespread, the subsistence aspect of milk production is still strong. This is reflected by the median values of 2 adult females and 1 cow per household. However, there are a number of households which see milk production as a profitable business and have already raised the intensity by feeding concentrates regularly. The concept of feeding concentrates is widely accepted. However, in many cases it is felt that in times of cash shortage, the cost of concentrates is unaffordable. In such situations wheat straw is a major component of dairy rations.

The data show that "typical" milk producing households are not easy to define. The great majority have little land and few animals. But even in this group there is a considerable number of households, which is regularly feeding concentrates to dairy animals. Therefore, the classification of households by their use of concentrates appears to be suitable for household selection in regard to the intensity of milk production for the following milk production survey.

In the course of this survey about 60 farms in 10 villages are visited once a month for 12 months. Village assistants record milk yield and fat percentage of all lactating animals and measure the fodder given to all animals. Fat percentage is measured at village milk collection centres, where each milk delivery is routinely tested for fat content, this being the basis of the producer price. Regarding the measurement of fodder, the village assistants weigh the feed components such as berseem, sorghum or wheat straw before they are chopped. This happens once daily. After chopping, the farmer is asked to indicate the fodder quantity given to each animal and this will then be weighed. In addition, an enumerator will visit the households to gather further information on topics such as milk utilisation, labour, liquidity, all of which show great seasonal variation. Also, details of farm and household economics, which were not covered in the previous survey, such as dung utilisaltion, will be investigated. Finally, the households will be asked about their opinions towards different strategies of intensifying milk production.
In order to obtain enough data on mortality and animal health for statistical analysis, it will be necessary to register further households. These will only be visited two or three times.

After the completion of data collection, several model households will be defined, according to which the economic models will be formulated. These will allow the evaluation of development strategies regarding intensification of milk production, according to their impact on the

FOLLOWS PAGE 9

previously defined households. This will provide valuable information for the planning of future development policies and the efficient allocation of increasingly scarce development funds.

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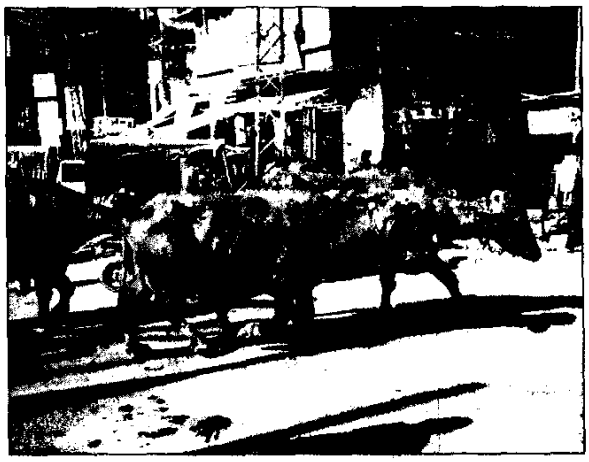

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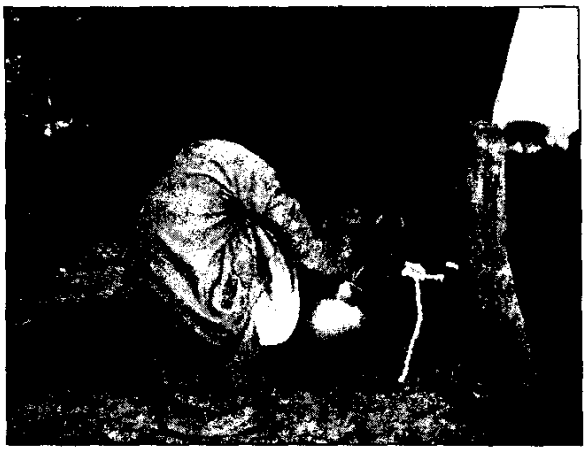

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Photos: 1. Buffaloes in the city (Rawalpindi). - 2. Milking at Okara (Punjab). - 3. Okara (Punjab): buffalo market. - 4. Milking at the farm (Faisalabad). - 5. Okara (Punjab): buffalo market.

THE ENVIRONMENTAL EFFECTS ON GROWTH TRAITS OF SWAMP BUFFALOES

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INTRODUCTION

The common buffalo production system in Asia is almost exclusively small farm situations integrated with crop production, marginal or landless producers. The buffalo number is 82 head per 1,000 Asian agricultural population (Sasaki, 1994). According to FAO statistics (1993), 95% of the world buffalo population, which was 148 million in 1992, is in Asia and all of which is only increasing at an average 1.5% annually for the past decade. On the contrary, the number of buffalo in Thailand is declining caused by a loss of agricultural land to industrial areas and the replacement of buffalo by small tractors for draught purpose. There are numerous problems facing buffalo production in East and South-east Asia. Limited land area in the countries such as Thailand, The Philippines, or Malaysia has resulted in a shortage of grazing area for buffalo. Castration of work buffalo, in the long run, has a negative effect on animal body size since larger animals are typically favoured for draught purposes and hence are prevented from breeding. A shortage of good breeding bulls caused by castration of buffalo has been recognised as a serious problem. Selective breeding animals were neglected and occasionally slaughtered. Eventually the small and low genetic merit animals were left in the herds and then the random natural mating by those unwanted animals took place most of the time (Bunyavejchewin, 1991). Buffaloes themselves present several disadvantage in reproduction pattern. Heat detection is difficult and thus AI technique has been less applied. The average first calving age is much higher compared with cattle and also the calving interval is longer. There is not a good opportunity to use genetic principles as tools for the improvement of buffalo production particularly the need for greater meat production because the present system of sire selection is unsatisfactory, the field recording of performance data and their utilisation alone or along with the farm data have not been properly evaluated. Consequently, no genetic response through selection and movement of genetic material from the breeding plan occurs. However, this improvement could be feasible both on genetic and environmental sides, because no attempt has been made to utilise statistical techniques which can separate these two components. Therefore, genetic information such as heritability, phenotypic and genetic correlation between traits, selection indices and response to selection of swamp buffalo must be pursued to accelerate the genetic improvement. A variety of modified selection schemes are then needed to set up and enhance the buffalo breeding program in Thailand. The objective of this study is to define the environmental effects on growth of swamp buffaloes raised at the Government farms in Thailand. The future development of swamp buffalo breeding program is discussed.

MATERIALS AND METHODS

Data of growth performances and pedigree information of 2,838 swamp buffaloes were collected separately from two buffalo breeding research stations, Surin (from 1983 to 1992) and Lamphyaklang (from 1986 to 1994). The same pattern of data recording has been assigned to the two stations. Every calf is weighed at birth but weaning weight is weighed over a four months range because it was planned to have three lots of weaned calves to be tested per year due to the testing facilities. Therefore the weaning weight of calves and two year weights were recorded at an age range from 229 to 614 days and 474 to 831 days, respectively. Different calving seasons were classified as hot and wet between February-May, hot and dry between June-September, and cold between October-January the following year. Dams used to produce calves have an age range from 3 to 22 years of age due to their good fecundity. The traits including fixed effects of years, seasons, sex of calf, age of dam and the interactions between traits were fitted using least square analysis. Effect of weaned age and two year age were also included in the model as covariate effect for weaning weight and two year weight. The analysis used GLM (SAS,1988) to test the significance by fitting the independent variables of season, year, sex, age of dam and between traits interactions as fixed effects and sires as a random effect.

RESULTS AND DISCUSSION

Birth weight and weaning weight of buffalo at Lamphyaklang were 31.20 + 6.17 and 168.29 + 33.29 kg and at Surin were 29.86 + 5.09 and 171.67 + 34.59, respectively. Pre weaning gain, post weaning gain and two year weight of buffalo in the Surin herds were 0.456 + 0.108, 0.627 + 0.67 and 347.69 + 42.07 kg, respectively. Birth weight of buffalo at Lamphyaklang was slightly higher than Surin but not for weaning weight. The results revealed that sex effect was highly significant ($p<0.01$) for birth weight, post weaning

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Table 1: Tests of significance.

Growth traits	season	year	sex	age of dam	R-s q	CV(%)
Birth weight	**	**	**	ns	0.25	15.16
Weaning weight	**	**	ns	ns	0.98	2.25
Pre weaning gain	*	ns	ns	ns	0.80	11.10
Post weaning gain	*	**	**	ns	0.76	7.06
Two year weight	*	**	**	*	0.58	7.00

* =P<0.05, ** =P<0.01

Buffalo Field Day at Surin.

weight and two year weight and slightly different for weaning weight except for pre weaning weight. The least square means showed that male is significantly 6.2%, 3.2% and 3.1% heavier than female for birth weight, weaning weight and two year weight, respectivly. Season within year effect was highly significant (p<0.01) for birth weight and weaning weight and not for pre weaning gain, post weaning gain and two year weight. It is not surprising that post weaning gain and two year weight do not have a seasonal effect due to the standardised feeding and housing during the testing procedure. Least square means for birth weight and weaning weight of the calves during the cold season were generally higher than those for dry and wet seasons but not for post weaning gain and two year weight. It can be explained that the calf born during October-January was with its healthy and well fed dam until weaning in a good wet season which was during June-September. Post weaning gain and two year weight were affected by the hot and dry season during February-May after which probably there is a delay in reproductive pattern such as late puberty and longer age at first caving. This is quite reasonable because buffalo calf will take about three months to adapt for the new environment at the test station therefore the data of first three months should not be taken into account. This result could invite to consider farm management pattern. Year effect was highly significant (p<0.01) for all traits except pre weaning gain. It is due to Surin and Lamphyaklang being situated where the irrigation system is inadequate and they depend on rain. Therefore the quality of pasture varied upon those conditions. In the drought year, the pasture was not in good condition thus affecting buffalo growth. In 1988 and 1989, there were severe drought at Lamphyaklang thus post weaning gain and two year weight were affected. Age of dam was not significantly affecting birth weight, weaning weight, pre weaning gain and post weaning gain and gave slight differences for two year weight. This result does not agree with the age of dam effects influencing weaning weight and post weaning weight of beef cattle (Hetzel et al., 1990; Raymond et al., 1981 cited by Howarth et al., 1995). However, in further study by Howarth and Johnston (1995) on various weight traits in different breeds of cattle, they showed that the age of dam in Brahman had little effect on the weight of its offspring. This could be explained in buffalo because females of any age produce enough milk for calf requirement and moreover, buffalo milk is high in fat (6-8%) and protein (5-6%) content.

CONCLUSION

Buffalo breeding program in Thailand is based on selection for growth and fertility, and buffalo data has been collected on various aspects of growth and fertility over the last 15 years. This is potentially one of the most comprehensive sets of the records being used for research aimed to estimating genetic parameters. However, effects of season, year, sex, age of dam and between traits interactions have to be primarily taken into account. These values are necessarily used in advanced genetic evaluation procedures in order to select the breeders for the next generation. Up to date system for selection of buffalo is based on the use of the increased growth performances and reproductive efficiency.

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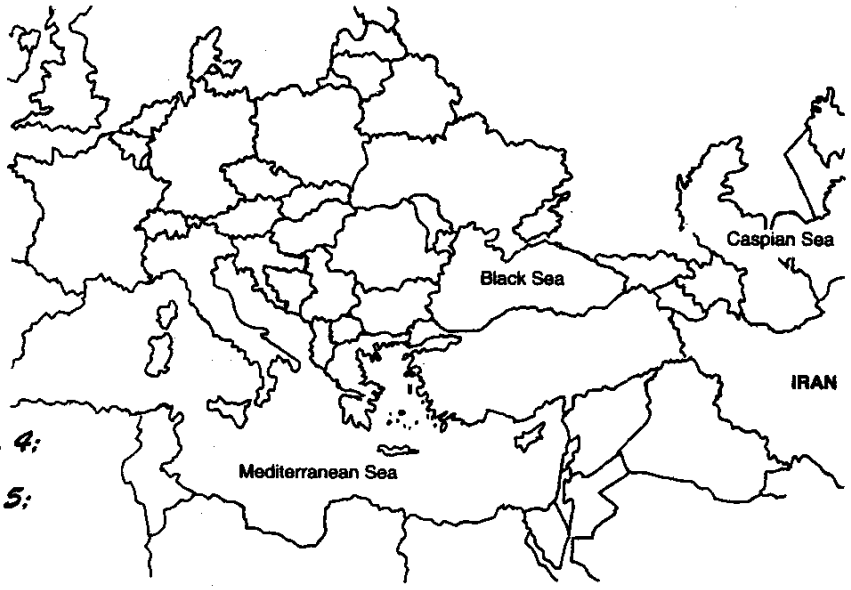
In each issue of the Buffalo Newsletter a description of Buffalo farming in every member country is presented. Egypt and Syria appeared in n. 3; Bulgaria and Albania in n. 4; Turkey and Romania in n. 5; Iraq in n. 6; Italy in n. 7; Azerbaijan in n. 8; Greece in n. 9.



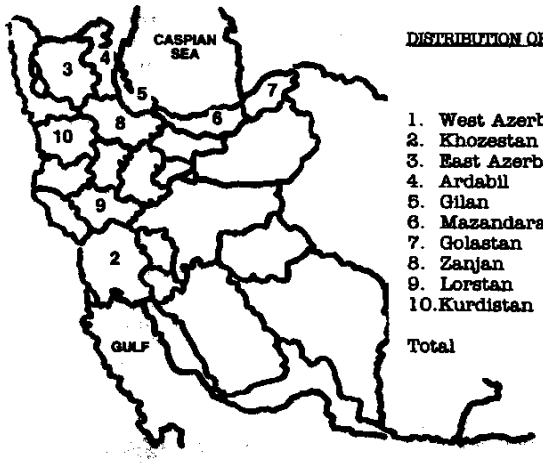
BUFFALO POPULATION AND PRODUCTION IN IRAN

1 – ORIGIN, TYPE, BREEDS AND CROSSING:
Mediterranean breed, two sub-populations:
Khozestani type (see photos page 13):
Azeri type (see photos page 13)

2 – GEOGRAPHICAL AREAS:
Khozestani buffalo: tropical area of Kohzestan.
Azeri buffalo: moderate and cold areas of West/East Azerbaijan and Ardabil; moderate and humid area of Gilan and Mazandaran.

3 – NUMBER IN 1997:
Total buffaloes about 460,000; Khozestani type 117,000; Azeri type 343,000;
adult females: 200,000
adult males:10,000
young stock: 250,000
Total buffaloes: 460,000.
The number is steady, slightly increasing.

4 – RESEARCH HERDS:
private herds: 23,000 (no. adults: 210,000; no. young stock: 250,000)
research herds: 3 (no. adults 293; no. young stock: 167).



DISTRIBUTION OF BUFFALOES IN IRAN

	heads
1. West Azerbaijan	130,000
2. Khozestan	115,000
3. East Azerbaijan	100,000
4. Ardabil	70,000
5. Gilan	30,000
6. Mazandaran	6,000
7. Golastan	3,000
8. Zanjan	2,500
9. Lorstan	2,000
10.Kurdistan	1,500
Total	460,000

5 – DESCRIPTION:
(see table 1)

6 – PRODUCTIVITY:
(see table 2)
- IS THE CALF SUCKLING?
Yes for 5 months in all herds.
- ARE COWS MILKED ONCE A DAY?
No.
- ARE COWS MILKED TWICE A DAY?
Yes, at the farm.
- ARE COWS MILKED BY HAND?
Yes.
- ARE COWS MACHINE MILKED?
Yes, in two farms, with portable milking machine.

7 – FERTILITY:
N. CALVES/YEAR: **0.90.**
SEASON OF CALVING:
autumn/winter.

8 – HOUSING:
Kohzestan: loose 100%.
Gilan and Mazandaran: loose housing in summer, tied in winter. West/East Azerbaijan: tied 100%

9 – ARE BUFFALOES USED FOR DRAUGHT?
No.

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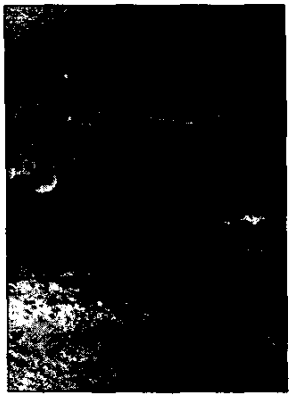
Kohzestani type bull.



Kohzestani buffalo.

Kohzestani buffalo.

Azeri type.

Azeri type.

Azeri type in a farm of Mazandaran.

Table 1.

	KHOZESTANI		AZERI	
	ADULT MALE	ADULT FEMALE	ADULT MALE	ADULT FEMALE
- HEIGHT AT WITHERS	142 cm	137 cm	137cm	131 cm
- WEIGHT	850/900 kg	650/700 kg	650/700 kg	450/600 kg
- COLOR	dark grey to black (sometimes spotted)		grey to black	
- HORNS	upward with ring at the end		backward	

Table 2.

	KHOZESTANI	AZERI
- N. DAYS LACTATION / YEAR	210	210
- LACTATION MILK YIELD (KG)	kg 1865	kg 1200
- AGE AT THE FIRST CALVING (MONTHS)	28 to 35	30 to 35
- AVERAGE LACTATION NUMBER	7-8	7-8
- AGE AT SLAUGHTER	male 18/24 months female 96/144 months	male 18/24 months female 60/96 months
- WEIGHT AT SLAUGHTER	male 450/600 kg female 420/650 kg	male 500/450 kg female 350/500 kg

Table 2.

	N. ADULT FEMALES	TOTAL MILK	CONSUMED FRESH	CHEESE	FERMENTED MILK	BUTTER/ GHEE	MEAT
BUFFALO	200,000	250,000	100,000	70,000	70,000	5,000	19,000
COW	4,000,000	1,900,000	700,000	500,000	600,000	50,000	250,000
SHEEP	20,000,000	460,000	100,000	170,000	170,000	10,000	290,000
GOAT	10,000,000	400,000	150,000	80,000	150,000	10,000	100,000
TOTAL		3,010,000	1,050,000	820,000	990,000	75,000	659,000

– ARE BUFFALOES USED FOR CART PULLING?
Yes, only in Azerbaijan, only males aged 2-8 years.

10 – SOURCE OF FEEDING:
Kohzestan: cereal straw, sugarbeet pulp, seasonal green fodder, wheat bran concentrates, barley, grazing. West/East Azerbaijan: cereal straw, apple juice pulp, bakery waste, grazing. Gilan and Mazandaran: grazing on rice pasture, bran, cotton seeds, straw, barley.

11 – TOTAL ANNUAL PRODUCTION BY SPECIES.
Year 1996. (see table 2).
OTHER PRODUCTS FROM BUFFALO: **leather, horns.**

12 – MILK RECORDING:
In all pedigree farmes (open nucleous breeding system) and in research herds.

13 – REPRODUCTION:
HAS EACH FARM ITS OWN BULL? **Yes.**
ARE THERE BULLS FOR NATURAL SERVICE AVAILABLE IN VILLAGES? **Yes, for 95% of buffaloes.**
ARTIFICIAL INSEMINATION? **1000 inseminated buffaloes per year.**

14 – DISEASES:
Pasteurellosis, black-leg, parasites (sarcocyst and hydatid cyst).

15 – SOCIAL POSITION OF BUFFALO FARMER:
Medium.

16 – PERSPECTIVES OF BUFFALO PRODUCTION:
Efforts are made by government to increase individual milk production.

Meeting for the buffalo improvement program in Kohzestan.

Green fodder cut for buffaloes in Kohzestan.

Abdulwahid Ghanemi, Livestock Affairs - Jihad-e-Sazandegi, Imam St., Ahwaz , Iran

THE EFFECT OF CROSSING ROMANIAN BUFFALO WITH MURRAH BREED ON MORPHOLOGICAL AND PRODUCTIVE TRAITS OF FEMALE HYBRIDS.

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[1]SCPCB, Tg. Mures; [2]ICPCB, Balotesti, Romania

ABSTRACT

In order to improve morphological traits and increase productivity a crossbreeding programme was performed with the Bulgarian Murrah breed (75% Murrah). Findings prove that hybrid females have body weight, lactation milk yield and fat percentage higher than the local female buffaloes.

INTRODUCTION

Researches done in Romania on origin and morpho-productive traits of buffalo (Bud I., 1984; Georgescu Gh. et al., 1988; Vaida M.M., 1924), indicate that the buffalo population of Transilvania belongs to the Mediterranean breed, with dual-purpose attitude (milk and meat) although productivity is lower than the one reported for Indian, Pakistani, Italian and Egyptian buffalo (Velea C. 1988; Zahariev Z., 1986).
In order to increase productivity and to reduce the long calving interval and the age at first calving, a crossbreeding programme was started in 1982 with the purpose to further perform selection within the F1 crossbred animals and achieve the following goals: adult liveweight of 500-600 kgs., average lactation milk yield of 1,600 kgs.(240-305 days), 7.5% fat and good attitute to machine milking.
In 1982, Bulgarian Murrah buffalo bulls and cows (75% Murrah) were imported and used on the Romanian population.

MATERIALS AND METHODS

The present investigation includes a buffalo population raised at the Research Station for Bovine Breeding at Sercaia, Romania, kept under official milk recording system. The crossing scheme (fig. 1) was done starting with 12 bulls and 18 females of the Bulgarian Murrah and 8 bulls and 147 females of the Romanian population. During winter the animals were kept in closed barns and fed on hay, maize silage and concentrates. In summer they were kept outdoor during the day and housed in shelters at night, fed on greed fodder and concentrates.

RESULTS AND DISCUSSION

The categories of females hybrids obtained by the crossing (fig. 1) consisted of 92 buffaloes of 56.25% Murrah type and 152 buffaloes of 37% Murrah type. Performance of these animals was compared with the performance of 144 Romanian buffalo, kept in the same management and feeding conditions.
Body weight according to hybrid category is shown in Table 1. It is approximately similar at the age of 6 and 12 months, while at 18 months, 24 months and at first lactation, the 56.25% Murrah hybrids have a 13.8%, 17.7% and 9% higher weight respectively than the local buffalo. At the same ages, the 37.5% Murrah hybrids have a higher weight of 5.8%, 8% and 6.2% than the local buffalo. Daily gain (Table 2) has a similar trend as body weight. In fact the 56.25% Murrah hybrids daily gain is 62 and 65 grams higher than the local buffalo from 12-18 months and from 18-24 months respectively; the 37.5% Murrah hybrids daily gain is 114 and 124 grams higher than the local buffalo

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Table 1: Evolution of body weight on category of hybrids.

Age (month)	Hybrid Murrah				Romanian Buffalo	
	56.25%		37.5%			
	n	X ± s.	N	X ± s.	n	X ± s.
Calving	92	31.6 ± 1.54	154	32.8 ± 0.26	144	32.9 ± 0.36
6	84	116.4 ± 4.39	138	111.3 ± 1.63	118	109.8 ± 2.11
12	76	171.6 ± 1.49	121	165.2 ± 1.44	87	161.2 ± 1.38
18	63	255.2 ± 1.07	108	237.6 ± 3.58	56	224.3 ± 2.84
24	56	360.1 ± 2.46	76	321.4 ± 3.20	49	297.5 ± 6.83
Lact. I	42	560.4 ± 19.32	38	545.8 ± 20.11	46	514.0 ± 21.22

Table 2: The evolution of average daily gain.

Period	Hibrids 56.25%		Hibrids 37.5%		Romanian buffalo	
(months)	N	X	n	X	n	X
0 - 6	82	443	136	434	109	426
6 - 12	63	311	103	298	81	284
12 - 18	46	462	82	400	47	348
18 - 24	36	528	64	463	43	404

Table 3: Evolution of milk and fat yeld in a normal lactation.

Trait	Lact.	Category of hybrid				Romanian buffalo	
		56.25%		37.5%			
		n	X ± s$_x$	n	X ± s$_x$	n	X ± s$_x$
kg Milk	I	42	1316 ± 8.47	31	1198 ± 7.86	109	931 ± 30.11
	II	38	1394 ± 7.86	27	1211 ± 9.34	94	1008 ± 42.72
	III	35	1427 ± 9.33	24	1342 ± 9.89	78	1039 ± 30.11
kg Fat	I	42	96.33 ± 0.24	31	86.06 ± 0.34	109	67.96 ± 0.47
	II	38	101.07 ± 0.32	27	94,41 ± 0.29	94	76.64 ± 0.34
	III	35	112.21 ± 0.38	24	104.17 ± 0.29	78	78.52

in the same age intervals.
Lactation milk yield and fat percentage of the hybrids is shown in Table 3 for the hybrids as well as for the local breed, respectively for first, second and third lactation. The 56.25% Murrah hybrids have a 385 kg, 386 kg and 388 kg higher yield than the local breed respectively in the three lactations. Fat yield is also higher.

CONCLUSIONS

We believe that much better performance can be obtained by the crossbred buffaloes even in the modest feeding conditions in which animals were reared. The best results were obtained when the percentage of Murrah blood was the highest (56.25%).

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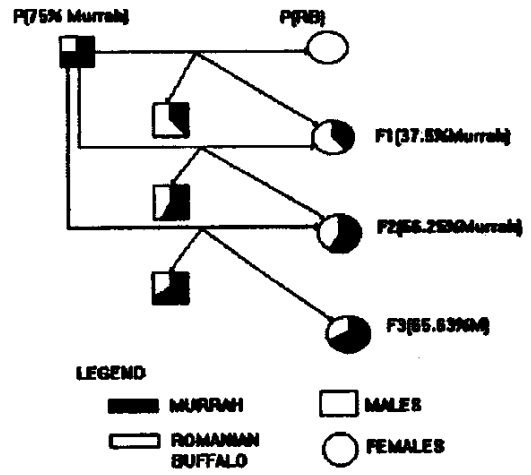
Fig. 1: The scheme of crossing between Romanian Buffalo and Murrah breed.



THE WATER BUFFALO (Bubalus bubalis) IN ARGENTINA

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The European breeds of cattle (Bos taurus) present high productivity in temperate climates, but usually produce at much lower levels in tropical and subtropical areas. Tropical breeds (Bos indicus) adjust better to adverse tropical conditions but they usually have smaller productivity.
The water buffalo (Bubalus bubalis), with it's efficiency of production under marginal conditions and it's potential for increased productivities, represent a new livestock alternative (1, 4, 8).
From the cattleman's point of view, wide regions of Argentina are under developed due to the inability of Bos cattle to adapt to local conditions. Water buffalo however adapt well to the extremely demanding conditions of these areas and represent an excellent alternative for these marginal zones (5, 8).
The water buffalo was introduced to Argentina from Brazil in the beginning of the century. A small number of animals (Mediterranean) were brought across the Uruguay River and establish mainly on large hunting preserves, in national parks or exhibited as zoological specimens.
In the early 1970s, more improved animals (River type) were imported for genetic upgrade. In 1979, 100 animals of the Jafaradabi and Murrah breed, were imported. Fourty (40) were sent to the Santa Rosa ranch located in the Esquina area of Corrientes Province and 60 to the La Florencia and the La Alicia ranches in the area of San Cristobal in Santa Fe Province (6,7).
Argentina currently has three (3) water buffalo breeds of economic importance. The "Mediterranean" (these represent 70 % of the water buffalo population in this country), the Murrah and the Jafaradabi. These animals are all double purpose (meat and milk) and many are triple purpose since are also employed for work (11).
The current water buffalo population in Argentina is estimated to be between 13,000 and 15,000. They are mainly concentrated in the subtropical humid areas of the northeast: in Corrientes, Chaco, Misiones and Formosa Provinces. However, the country has other areas where water buffalo production is possible as these animals do well in high elevation temperate areas as well as in warm humid low lands . The tropical and sub-tropical area available for water buffalo production totals about six million hectacres including the low lands of Santa Fe Province, the Esteros of Ibera in the Corrientes Province, the low coasts of the Entre Rios Province and the delta of the Buenos Aires Province (3, 11).
Eighty three percent (83%) of the water buffalo population of the country is in Corrientes Province (data of the Agricultural National Census of 1988) (2).
Water buffalo meat production in Argentina has been characterized by excellent calving percentages during the last 14 years. The Esquina Ranch (Corrientes Province) with 70%, San Cristobal (Santa Fe Province) with 75%, and Riacho He - He (Formosa Province) with 70%.
In Esquina (Corrientes Province) with a semi-intense grazing system and forage of poor quality, they have achieved, over 8 years, a daily gain average before weaning of 0.625 kg and after weaning of 0.524 kg. This produced a weaning weight average of 249.07 kg (weaned at 8 months or 200 kg), and an average weight at 23 months of 437.91 kg. Variations from the annual averages, of 395 to 471 kg of live weight were observed. This same production method achieved weights of 525 kg average at 27-39 months, 630 kg at 54 months of age in male only groups. Most animals of this type are finished for slaughter at 27-30 months.
At Riacho He - He (Formosa Province) records of weight gains accomplished between 1982 and 1989 with entire and castrated males and with females, gave daily increases of 0.426 kg to 1.179 kg (12). This was on a grazing system with native grasses. (*Paspalum intermedium and Sorgastrum arostoides*).
Water buffalo milk production is just beginning to develop in Argentina. A small dairy product industry exists for the production of mozarella cheese in Corrientes, Santa Fe and Buenos Aires Provinces. In Corrientes Province, the Santa Maria del Rosario Ranch located in Paso de la Patria has a herd of 300 excellent Murrah and Mediterranean milking buffalo producing a number of water buffalo dairy products including mozarella cheese. Each milking buffalo produces 5 to 6 milk liters per day with a 7.9% to 8.9% butterfat (mean lactation 210-220 days).
Calving rates of 90%, a calf mortality of 2% and lactation lengths of 210-220 days are characteristic of this ranch.
The adult breeding males are used as herd bulls at about 500 kg or 24 months. Females are usually bred upon reaching 2 years or about 400 kilos. Feeding system consists of semi intense grazing of natural pastures. During lactation some "malt scum" (brewer's waste barley) concentrate is fed. (3)
The La Florencia ranch, located in Santa Fe Province in the area of San Cristobal, has a herd of 200 water buffalo. Their production is used for "mozarella" and "provoleta affumicata" cheese (7)

FOLLOWS PAGE 16

The development of the water buffalo industry in Argentina is relatively small and does not really compete with the dairy production of Bos cattle. It is intended to supplement that production and provide a viable alternative for livestock production in areas of the country unsuitable for traditional Bos cattle(6, 7).

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INTER-REGIONAL BUFFALO RESEARCH NETWORK

Workshop on "Experiences in Buffalo Nutrition"
Mustafa Kemal University, Antakya, Turkey,
8-10 October 1998

PRELIMINARY AGENDA

Thursday October 8th

9.00 - 9.30	Arrival of participants
9.30 - 9.45	Rector of MKU
9.45 - 10.00	Governor of Hatay
10.00 - 10.15	National Coordinator of the Network for Turkey (O. Sekerden)
10.15 - 10.30	G. Rossi: Introduction in the Workshop, background and purposes.
10.30 - 11.00	G. Campanile, Management and feeding strategies at the Agricola Volturno Buffalo Farm,Caserta, Italy, with particular emphasis to nutritional aspects.
11.00 - 11.30	H. Rubinchick and G. Adin, Management and feeding strategies at the Buffalo Farm, Moshaw Bizarom, Israel with particular emphasis to nutritional aspects.
11.30 - 12.00	O. Sekerden: Buffalo Feeding in Turkey.
14.00 - 14.30	Saad Al Hayani Management and feeding strategies at the Ismailia Buffalo Farm, Ismailia, Egypt, with particular emphasis to nutritional aspects.
14.30 - 15.00	Rapporteur of the Workshop: introduction in the discussion.
15.00 - 17.30	Discussion. The experiences and problems presented by the farmers will be considered and discussed by the audience, composed of scientists in animal nutrition from Italy and Egypt The National Coordinators of the member countries of the Buffalo Network will also participate in the discussion (Italy, Iran, Iraq, Syria, Greece, Romania, Bulgaria, Azerbaijan).

Friday October 9th

9.00 - 12.00	Discussion will continue as in the afternoon of Thursd.
14.00 - 17.30	Rapporteur: conclusions and proposals for research topics to be investigated in the future and projects to be eventually proposed. A final document including a list of recommendation will be prepared. This is the most important aspect of the Workshop, i.e. to agree on common research topics to be tackled within the Buffalo Network.

Saturday October 10th

8.00 - 10.00	Visit to Ilikpinar village (buffalo herds)
10.00 - 12.00	Visit to MK University farm
14.00 - 18.00	Visit to St. Pierre Cave Church and Mosaic Museum of Antakya

The organizer of the Workshop is prof. Ozel Sekerden, Department Animal Science, Mustafa Kemal University, Antakya, Turkey. Fax 0090 326 2673844. Do contact her for accomodation details.

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BUFFALO RECORDING

Animal recording is a prerequisite for any serious effort to develop livestock production at both farm and industry level. The International Committee for Animal Recording (ICAR) is a non-governmental, non-profit organization concerned in the progressing of animal recording world-wide on solid scientific and technical basis and in collaboration with other institutions. Organized animal recording has been practiced for long in most developed countries and was indeed the basis for the realised genetic improvement and the understanding of production systems. However, animal recording is not common practice in developing countries; FAO, sustaining the idea of assisting countries in developing and better managing their genetic resources which requires appropriate recording systems, has supported ICAR in the organization of an **International Workshop on Animal Recording for Smallholders in Developing Countries**. The Workshop was held at the National Dairy Development Board of Anand (India) on 20-23 october 1997 and attended by experts from more than 25 countries (see Buffalo newsletter no. 8, December 1997). **Proceedings of the Workshop** edited by K.R. Trivedi are available on request.
The ICAR Working group on Buffalo recording is ready to propose development actions. Those who are interested either in the proceedings of the Anand Workshop or in the activities of the Buffalo recording group should contact the editor of the Buffalo newsletter.

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In order to promote the exchange of information and documentation on buffalo, the following cooperation agreement was signed by the coordinator of the FAO Buffalo Research Network (Europe-Near East) and the coordinator of the Thai Buffalo Network

AGREEMENT BETWEEN FAO BUFFALO RESEARCH NETWORK (EUROPE-NEAR EAST) AND THAI BUFFALO NETWORK

The coordinator of the FAO Buffalo Research Network for Europe and the Near East, Giancarlo Rossi and the coordinator of the Thai Buffalo Network, Ancharlie Na-Chiangmai have agreed on the following items.

Because the two Networks, the composition of which is reported in the Annex, have the purposes:
- to promote the exchange of information on buffalo among countries;
- to implement the development of buffalo production;
- to promote common research projects between countries;

1. the coordinators of each of the two Networks will be informed on all activities implemented by the other Network;
2. the coordinators of each of the two Networks will be informed in advance on the meetings planned by the other Network and will be allowed to take part to them. In any case, the Minutes of the meetings will be sent to the other coordinator as soon as they are ready.
3. The reciprocal participation of one member of the other Network to specific Symposia, Workshops and Seminars organised within the Network will be highly appreciated and, when possible, financially supported. In any case, a report on the topics discussed in the above meetings as well as one copy of the Proceedings as soon as they are published will be sent to the coordinator of the other Network.
4. The "Buffalo newsletter" is the information journal of the FAO Buffalo Research Network for Europe and the Near East, published in three issues yearly and circulated in 1200 copies all over the world. The Thai Buffalo Network will cooperate to advertising and increasing the circulation of this journal in Thailand and Asia and to supply at least one article (scientifical or technical) to each issue.

FAO Buffalo Research Network, (Europe-Near East) The coordinator	Thai Buffalo Network The coordinator
(Giancarlo Rossi)	(Ancharlie Na-Chiangmai)

ANNEX

FAO Inter-regional Research Network on Buffalo (Europe-Near East)

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Chalong Vajirapakorn, Lecturer, Khon Kean University.

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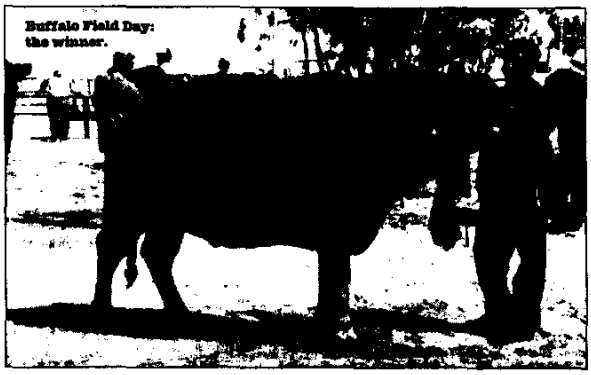
Buffalo Field Day, Surin Livestock Breeding Station, Thailand, May 13, 1998
Minutes of the National Buffalo Research and Development Committee Meeting

The Buffalo Field Day was held at Surin Livestock Breeding Station, Thailand on May 13, 1998, organized by the National Buffalo Research and Development Center for Thailand (Thai Buffalo Network). A Buffalo Competition took place participated by 100 buffaloes from various provinces of the North-eastern part of Thailand. Buffaloes were classified in two groups: two years old bulls and heifers. (The winner is shown in the picture). During the day, the National Buffalo Research and Development Committee held a meeting attained by 42 participants from 16 institutes involved in buffalo research in Thailand. The following four topics were discussed in the meeting: Report of the Research activities on Buffalo of the Livestock Research Institute, Progress report of re-organizing the National Buffalo Research and Development Center; Progress report on Performance test programme; Buffalo Research Fund. Ancharlie Na-Chiangmai reported in the meeting that a cooperation agreement was signed between FAO Buffalo Network (Europe and the Near-east) and Thai Network, and future joint activities were judged very useful. Discussion lead to recommendation about future buffalo research cooperative programs between different Institutes of the country.



Buffalo Field Day: the winner.

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