

## PRODUCTION AND REPRODUCTION PERFORMANCE OF NILI-RAVI BUFFALOES UNDER FIELD CONDITIONS OF PAKISTAN

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### ABSTRACT

The objective of the longitudinal study was to evaluate the production and reproductive performance of buffalo on small-holder dairy farms in Pakistan. The data were collected from 207 farms located in the districts of Okara and Bhakkar. Milk production and reproductive parameters were recorded on a weekly basis by trained extension workers in specifically designed herd books for 18 months from November 2007. Preliminary, results indicate that the average milk production per lactation was higher ( $P < 0.05$ ) in buffaloes (1226.63 ± 43.50 lit) than in cows (1027.04 ± 44.88 lit). The percentage of oestrus detection, A.I, natural service and pregnancy rate for buffaloes were (0.38%, 7.29%, 19.17%, 78%), respectively, during the whole year. We conclude that neither the Nili-Ravi buffalo nor cows are attaining their potential for milk production. The low reproductive efficiency of these animals is mostly likely related to both the poor technical acumen and the nutritional status of animals. Provision of appropriate extension services for these farmers will improve the productive and reproductive performance of buffaloes.

**Key words:** Buffaloes, Production, Reproduction.

### INTRODUCTION

The world population of domestic buffaloes, *Bubalus bubalis*, has been estimated to be more than 150 million (Bhat, 1992) or one-eighth the population of cattle, with the numbers steadily increasing. Two main types of domestic buffalo are the river buffalo and the swamp buffalo. The Nili-Ravi breed of buffalo is classed as a river type and is the best milk producer amongst other breeds of buffaloes in the world. They have a wedge shape, massive frame, small curly horns, and wall eyes. They often have white markings on the forehead, face, muzzle and legs and white switch of tail (buffaloes with such markings are highly desired and popularly called “Panj Kalia” (Warriach *et al.*, 2008).

Pakistan like many developing countries has an agrarian rural based economy. Livestock is a major contributor to the national (12%) and agriculture (50%) economy (Pakistan Economic Survey, 2006). Milk is the key livestock product. Pakistan is ranked the 4<sup>th</sup> largest milk-producing country in the world. Seventy percent (70%) of the milk and fifty percent (50%) of total meat produced in Pakistan comes from buffalo (Usmani *et al.*, 1987). An important point considering milk constituents are its higher values in buffalo than cows: milk fat 6.5-8.0 % versus 3.5-4.0% and solids- not- fat 9.0 – 10.5% vs. 7.5 – 8.5% (Gordon, 1996). Thus the price of buffalo milk tends to be higher than the milk produced by dairy cattle. Furthermore, buffalo utilize poorer quality roughages, adapt to harsher environments and are more resistant to several bovine tropical diseases (Gordon, 1996).

Despite these merits, buffalo has relatively poor reproductive efficiency that varies little with location throughout the world. Buffalo exhibit many of the known reproductive disorders and have delayed onset of puberty, poor oestrus expression, longer post partum ovarian quiescence, and most importantly lowered conception rates particularly when bred artificially (Gordon, 1996). It appears that because buffalo is populated mostly in developing countries with meager resources, it remained neglected or underutilized in terms of quality research in the area of health, management, nutrition and reproduction.

The role of extension has been to provide research-based education and information to the production sector. Services to the dairy sector are being provided by government agencies and a range of NGOs, and virtually all services providers who interact with the farmers are veterinarians or para-veterinarians who performed vaccination, treatment and A.I. Limitations in the extension service and the research/extension interface are considered to be bottlenecks in the development of the dairy sector in Pakistan.

Keeping in view these facts the major objective of this study is to evaluate the production and reproductive performance of buffaloes on small-holder dairy farms under field conditions of Pakistan.

### MATERIALS AND METHODS

**Dairy Project Background:** In 2007, a 2 ½ year dairy project “Improving dairy production in Pakistan through improved extension services” was started in the two

contrasting environments of districts Okara (well developed) and Bhakkar (less well endowed) with the objectives of increasing dairy production through improved extension services. Small dairy farmers having 3-10 (buffalo and/or cattle) for production are the main target group in the project. Improved extension services as well as veterinary services are being provided to the farmers by already existing agencies (Livestock & Dairy Development Department, Punjab, National Rural Support Program and Idara-e-Kissan) in both of the districts.

**Longitudinal survey:** The data were collected from 207 farms located in the districts of Okara and Bhakkar. Milk production and reproductive parameters were recorded on a weekly basis by trained extension workers in specifically designed herd books. Milk was measured with weighing scales. One year data of milk production from ( $n=222$ ) and ( $n=163$ ) buffaloes and cows respectively, were collected for analysis. Reproductive parameters were tracked from ( $n=385$ ) animals for analysis.

**Farmers and extension workers trainings:** The project emphasized on comprehensive interdisciplinary educational program of discussion group meetings, workshops and trainings of both farmers and extension workers separately Table 1. Basic husbandry, nutrition, forages, health and calf management were the first areas addressed during the first six month of the project.

**Statistical analysis:** Data was collected on a weekly basis and entered into a data base containing all the information about each of the farm. A single lactation of milk production was calculated from each animal based on the weekly production as well as the duration of the particular animal's lactation. Then these estimates of the total milk production during the lactation were compared between the different breeds and species of animals using an ANOVA. The reproduction data values are based on observations from the field and counts of observations made by farmers and field workers. These values are simply reported as percentage values of the observations and no statistical analysis was carried out.

## RESULTS

Average milk production per lactation was higher ( $P<0.05$ ) in buffaloes ( $1226.63 \pm 43.50$  lit) than in cows ( $1027.04 \pm 44.88$  lit). Average milk production per lactation in buffaloes and various breeds of cows have been presented in Fig 1. The percentage of reproductive parameters like oestrus detection, A.I, natural service, dry and pregnancy rate for buffaloes during the whole one year have been presented in Fig 3.

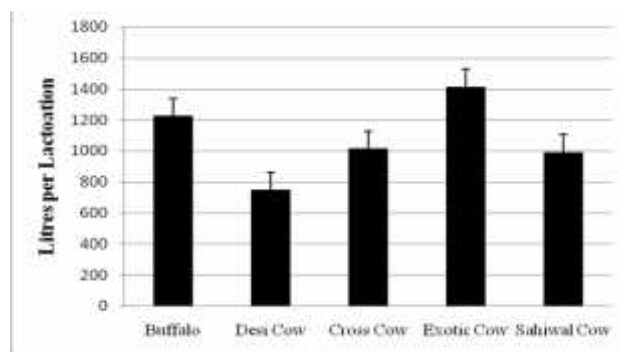


Fig 1. Average milk production per lactation was higher ( $P<0.05$ ) in buffaloes than in cows

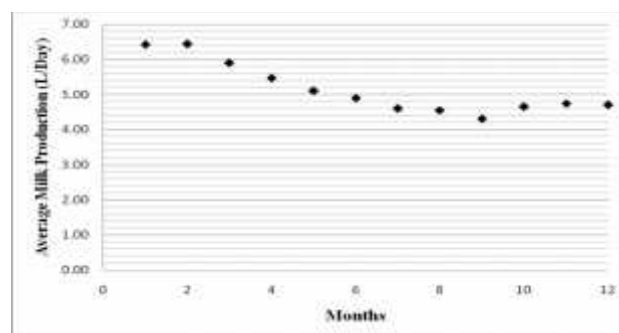


Fig 2. Average milk production per lit/day of dairy animals in field conditions

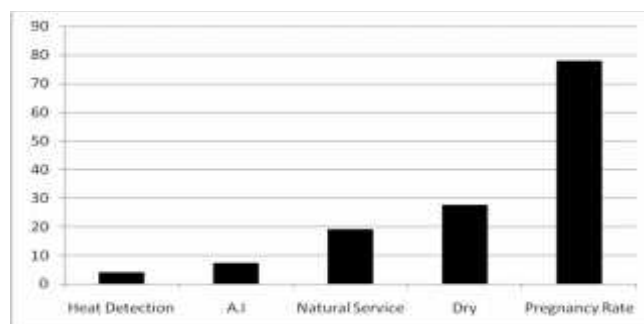


Fig 3. Reproductive parameters in buffaloes around the year in field conditions



Fig 4. Analysis of Milk Marketing Chain- Umm e Zia, 2007

**Table 1. Topics and visitation schedule of the training of farmers and extension workers during first year of the project**

Visiting order	Farmers trainings	Extension workers trainings
1.	Basic husbandry management practices	Ultrasonography in animal reproduction
2.	Fodder demonstration plot training	Basic farm management principles
3.	Herd health and calf management	Herd health and calf management
4.	Animal health and nutrition module	Animal health and nutrition module
5.	Calf nutrition and health	Calf nutrition and health

## DISCUSSION

The present study demonstrates that in buffaloes, average milk production per lactation was higher than in cows under field conditions. Milk production potential is about double the present level of milk production (Iqbal and Ahmad, 1999). This is evident by comparing the maximum milk production observed in the elite herds maintained at Government research stations with those on private livestock farms. Several researchers have reported data on maximum milk production potential of the breeds. Shah (1991) reported that Nili-Ravi buffalo have a production potential of 5000 lit per lactation of 305 days. Similarly, Husnain and Shah (1985) reported that maximum breed potential observed in the elite animals of Sahiwal is up to 6500 lit of milk per lactation of 305 days. A possible short term strategy for increasing the milk production on any farm is by the better management of the existing feed resources through balanced feeding. Past research has shown that this yield increases of 30% are achievable if this is carried out (Burki *et al.*, 2005), as well as significant reductions in production costs (Mahmood *et al.*, 2004). However, for long term success and sustainable growth there is a need to plan and implement a simple and effective selective breeding regime to allow for an increase in milk production for the entire country.

This present study shows a gradual decline in average milk production per day of dairy animals during the year. This is shown in Fig 2. In Pakistan, this decline coincides with an increase in demand during the hot summer months. This is due to the fact that most of the buffaloes calving takes place during July-September (Ahmad *et al.*, 1981) and very few calving occurs during February-June. Furthermore, milk production is associated with the availability of green fodder and is at its maximum between January and April and hits a low

from May to August. Alternatively, milk consumption is low during the winters and is at its peak during the summer due to higher intake of consumer intake of milk products such as lassi, yogurt, and ice cream Fig 4.

In the present study, oestrous detection in buffaloes was observed in only 0.38% of the small-holder farmers. This could be due to a number of factors. One of the most likely reasons for the low oestrous detection rates could be due to husbandry practices such as the practice of keeping dairy animals tied up. In doing this the animals are unable to show as many signs of oestrous as they could if they were kept free and untied. Furthermore, buffaloes have more tendencies to show heat signs during night and negligible number of the farmers observed the oestrous signs during the night time (Warriach *et al.* unpublished data). Season is also one of the other extrinsic factor that influence on the oestrous behaviour symptoms. In the tropics, high ambient temperature reduces sexual activity in the day time (Jainudeen, 1977) and shortens the oestrous period (Gill *et al.*, 1973), and the incidence of silent oestrous is more common during the hot summer season. These adverse effects of heat stress make oestrous detection more difficult and may exert a considerable influence on the oestrous behaviour in buffaloes.

In conclusion, preliminary results indicated that neither the Nili-Ravi buffalo nor cows are attaining their potential for milk production. The low reproductive efficiency is mostly likely related both to poor technical acumen and nutritional status of animals. Provision of appropriate extension services for these farmers will improve the productive and reproductive performance of buffaloes. It is hoped that the data generated from this longitudinal survey will be helpful to devise better strategies for improved extension services in order to optimize the dairy production of small holder farmers and will have a ripple effect for the others to follow.

**Acknowledgements:** The authors sincerely thank the cooperating small dairy holder farmers and their families, extension workers, research assistants for participation and contribution to this project; ACIAR for funding the project No. LPS/2005/132.

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