BUFFALO MANAGEMENT UNDER SEMI—FREE GRAZING SYSTEM: PROBLEMS AND PROSPECTS. A CASE STUDY.

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SUMMARY

This study points out that the semi—free grazing buffalo management system in which animals are grazed on uncultivated lands either freely or being tethered, is becoming less practical as uncultivated lands become scarce with increasing population pressure on land, and also under this management system both animal productivity and income generating capacity of buffalo husbandry remains much lower than its potential level. Therefore, if buffalo husbandry is to be revived, it is necessary to shift from the current system to an appropriate alternative buffalo management system.

Introduction

The water buffalo which played a vital role in the rural agrarian economy in Sri Lanka as a source of draught power, milk and organic manure, has recently been replaced by tractors to a considerable extent. In consequence, the water buffalo has become a neglected animal, and both buffalo population and the number of buffalo holders have been gradually declining. With these changes, today buffalo husbandry is confined mostly to low—income small farmers, tenants and landless farmers who cannot afford to purchase or to hire tractors. For these disadvantaged groups, buffaloes provide power for land preparation and threshing, milk, adding protein to their otherwise less nutrious meals, and organic manure to enrich the soil on which they cultivate. The buffalo ownership is particularly significant for the landless people because buffalo ownership enables them to get lands from others to cultivate as tenents. Furthermore, buffalo ownership provides a sort of insuarance against unexpected crop failures since buffaloes could be sold when in need of cash.

Therefore, buffalo husbandry should not be neglected any more, instead appropriate measures should be taken to revive it for the benefit of the disadvantaged groups in the rural economy. It is also significant to the national economy since it can save the foreign exchange that is spent for the importation of tractors and fuel. Its significance as a source of draught power cannot be overlooked even in the near future because the alternative energy sources such as bio—gas, solar energy, wind and hydro—power which are often recommended for non—oil producing developing countries are less applicable to the

tillage operation. In an effort to devise appropriate measures to promote the buffalo husbandry, a deep knowledge about buffalo management systems and their advantages and limitations are necessary since such a knowledge will be useful in providing guidelines for an alternative appropriate buffalo management system. The present study intends to provide this knowledge with respect to the semi—free grazing buffalo management system* which is widely practised in the densely populated Wet Zone and Intermediate Zone where 58% of the total buffalo population exist.

Methodology

This study is mainly based on the primary data collected from a field survey which was conducted in three agrarian service divisions in the Kurunegala District, viz Yakwila, Narammala, and Kuliyapitiya. While one—third of the national buffalo population exist in the Kurunegala District, the semi—free grazing buffalo management system is predominant there. This survey was conducted in two stages, and at the first stage which was a preliminary survey, 20 buffalo owners and ex—buffalo owners selected from all three agrarian service divisions were interviewed with a view to collecting preliminary information required for structuring the questionnaire. The second stage was a comprehensive survey in which two structured questionnaires were administered to 69 buffalo owners and 30 ex—buffalo owners. Samples were selected in consultation with the cultivation officers in the selected agrarian service divisions, and in the process of selection attempts were made to select the buffalo owners with small as well as large buffalo herds.

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*In Sri Lanka, two major buffalo management systems such as free grazing system and semi—free grazing system can be identified. Under these both systems, animal feeding is almost exclusively rely on the green fodder naturally grown on uncultivated lands. While the former system is widely practised in the Dry Zone where uncultivated lands are still sufficiently available, the latter system is practised in the Wet Zone and Intermediate Zone where uncultivated lands are scarce. Under the free grazing system, after the period of land preparation in which animals are used for draught, the farmers place their animals under the care of professional herdsmen who drive the herds to distant locations with uncultivated lands such as jungles, scrublands, irrigation tank beds, and river banks where animals are allowed to move freely. The animals are kept there until the harvesting period after which animals are driven back to the fallow paddy fields to feed them on paddy residues. Thus, under this management system, animals are kept free throughout the year.

Results and Discussion

Major Characteristics of the Buffalo Husbandry Under Semi–Free Grazing System:

Socio–economic characteristics of buffalo holders: All the surveyed buffalo holders were paddy farmers, and their major source of income was farming. While 86% of the buffalo holders surveyed depended solely on farming, 7% gained some income from non–farm sources to supplement their farm income. Another 7% of them depended mainly on non–farm income. It was found that the buffalo owners' socio–economic status was comparatively lower than the district average in terms of the land ownership. For instance, the average size of land holdings among the buffalo holders was 2.75 acres whereas the district average size was 5.08 acres. Furthermore, it was found that the majority of buffalo holders were landless tenents. While 50% of them were landless tenants, 32% and 19% were owner–tenants and owners respectively. Therefore it seems that the buffalo holders belong to the most disadvantaged category in the rural community. Most of the buffalo holders were of old age. While 54% of them were over 50 years, 29% were between 30–50 years in age. Only 17% of buffalo holders were below 30 years.

Herd Characteristics: Among the sample buffalo holders, 80% kept buffaloes only, and others kept both buffaloes and cattle. The cattle population was less than half of the buffalo population among the sample buffalo holders, and average size of buffalo herds (7.65 animals) was much higher than the average cattle herd (4.7 animals). Of the total buffalo population among the sample buffalo holders, 78% was local, 16% was cross–bred, and 6% was hi–bred. The age structure of the buffalo population was characterised by its large proportion of young animals. It was found that 40% of total buffalo population was below 5 years, 32% was between 5–9 years, 19% was 10–14 years, 5% was 15–19 years, and 4% was over 20 years. Though the size of buffalo herds varies within a wide range (2–25), the average size among 40% of buffalo holders was 3–6 animals, and among 20% of buffalo holders, the average herd size was 6–9 animals. In extream cases, 13% of buffalo holders had herds of below 3 animals, and 11% had herds larger than 15 animals. Major motive for buffalo rearing was the draught power. While 98% of the surveyed buffalo holders mentioned draught power as the major motive, organic manure was mentioned by 58% as the secondary motive. Significance of buffaloes as a source of income was mentioned by 41% as a third motive. However, milk production was least mentioned.

Land utilization for grazing: As it has already been pointed out the majority of buffalo holders were either landless or very small farmers, and therefore the buffalo holders predominantly graze their animals on the lands where they have no ownership, such as coconut plantations, fallow paddy fields, public lands, road—sides and neighbours' home gardens. There was no tradition of pasture cultivation or feeding with cut-grass among the sample buffalo holders, instead the animals are grazed on naturally available green fodder and paddy residues. The pattern of utilization of land for grazing varies seasonally. During the period when paddy fields remain fallow (April—June, August—October), animals are predominantly fed on residues on paddy fields, and during the cultivation period,animals are grazed on coconut plantations, neighbours' home gardens and some public lands in the village (Table 1).

Those who utilize privately owned coconut plantations to graze their animals, usually have an agreement with the owner/manager of the concerned coconut plantation. According to this agreement, owner of the animals is obliged to keep clean the area of the plantation grazed by his animals. It was found that some large coconut plantations were divided among many buffalo and cattle owners for grazing under this agreement. However, it seems that the management of the state-owned coconut plantations often hesitate to permit the buffalo holders to graze their animals in these plantations. There is a tradition among villagers themselves that the non—buffalo owners permit their neighbours to graze their animals in their home gardens. In such instance, the land owner gets only the benefit of the organic manure that would remain in their home gardens.

In both cultivation and non—cultivation periods, animals are predominantly kept in the owners' home gardens at night. It was found that 74% of the sample buffalo holders during the non cultivation period, and 45% sample buffalo holders during the cultivation period kept their animals in their home gardens at night. However, many of those who kept their animals in coconut plantations kept them at the same place through day and night.

Method of animal keeping : During the cultivation period, animals are predominantly kept tethered on the grazing lands in order to prevent them from causing damage to the crops whereas during the non—cultivation period when animals are fed on paddy residues on the fallow paddy fields, they are allowed to move freely. Of the buffalo herds grazing on the fallow paddy fields during the non—cultivation period, 43% were allowed to move freely and another 37% were allow-

TABLE I

Land Utilization for Grazing

Period	Land Types					
	Home Gardens %	Neighbours' Homegardens %	Road–Sides %	Fallow Paddy %	Public Lands %	Coconut Estates %
Cultivation Period	26	15	11	00	07	40
Fallow Period	11	01	00	76	01	11

Unit : Percentage of Buffalo Holders.

TABLE 2

Method of Animal Keeping

Period		Methods of Animal Keeping			
		Tethering %	Tied–to–Post %	Free–under Supervision %	Free %
Cultivation Period	Day	83	00	09	08
	Night	38	60	00	02
Fallow Period	Day	35	00	30	35
	Night	18	82	00	00

Unit : Percentage of Buffalo Holders.

ed to move under the supervision of herders. Only 20% were kept tethered. On the other hand, during the cultivation period, animals were always kept tethered. For instance, 99% of herds grazed in the coconut plantations, and 100% of herds grazed in the neighbours' home gardens

were kept tethered. Furthermore, animals were always kept tethered when they were grazed on road—sides and owners' home gardens. However, during both cultivation and non—cultivation periods, animals were tied to posts in the owners' home gardens at night (Table 2).

Feeding system : In contrast to the improved management systems, hand—feeding is not practised under this system, instead animals are allowed to feed on naturally available green fodder or paddy residues on the ground where they are tethered or move freely. For instance, during the non—cultivation period, 92% of buffalo holders and during the cultivation period, 77% of buffalo holders let their animals to feed on naturally available green fodder. However, there were few cases in which animals are provided with straw during the cultivation period since the animals have poor access to naturally available green fodder during this period. No one used concentrate feeds . To provide drinking water, buffaloes were driven to the nearby irrigation tank or irrigation canal. Those who had no access to such sources of water supply, used to keep small rain—fed ponds*(pataha)* in their land holdings. It was found that the major source of drinking water for buffaloes was irrigation canals, and the other sources such as irrigation tanks, *patahas* and wells were secondly important. For wallowing, irrigation canals were mostly used, and nexts were irrigation tanks and *patahas.*

Disease problems : Mortality rate among calves was 21.87% and among the adults it was 2.08%. These figures are considerably lower than those under the free grazing system (Siriwardene, 1980). The major cause for calf mortality was paracitism, and it accounted for 95% of the calf mortality. On the other hand, the major cause for mortality among adults was haemorrhagie septicamia, and it accounted for 90% of the deaths among the adults. While 58% of the buffalo holders have given western medical treatments, 48% have given native drugs. For haemorrhagie septicamia, western medical treatments were more popular. In this case, 61% have given western medical treatments, and only 39% have relied on native drugs.

Economic characteristics : Under this management system, buffaloes are predominantly used for draught power during the short cultivation period of 5—6 weeks. While 60% of working hours were devoted to provide draught power for the owners' farm work, rest of the working hours were devoted for custom work. Expenditure on purchasing ropes which were used to tether the animals, accounted for a greater share of the expenses. Payment for compensation for crop damages caused by the tresspassing animals, and madical expenses

are the other cash items (Table 3). The most important fact to be highlighted here is that the cost of feeding which accounts for a greater share of the cost of animal husbandry under the improved management systems, is almost zero under this system. If family labour spent for

TABLE 3

Buffalo Herd Profitability

INCOME	
– Milk	0.00
– Draught	6450.00
– Sales of Animals	600.00
– Manure	1250.00
– Stock Inflation (17%)	971.00
GROSS INCOME	9271.00
EXPENSES	
– Veterinary	40.00
– Ropes	545.00
– Depreciation/Meintenance	87.00
– Hired Labour	0.00
– Other	65.00
NET HERD INCOME	8534,00
– Family Labour	6200.00
– Imputed Interest (15%)	925.00
NET HERD PROFIT/LOSS	1409.00
RETURN ON CAPITAL %	37.85%
Rs./FAMILY MAN DAY	9.00

Note :
Method of Estimation–
Draught Income : 43 working days (25 self work + 18 custom work) x 2 pairs = 86 x Rs. 75.00 = Rs. 6450.00
Cost of Lobour : 3 Hrs/Day x 365 Days = Hrs. 1095/8 = 137 Days Labour for working on own paddy fields=18 Days. The total 155 days 155xRs.40 = Rs.6200.00
Capital : Stock value Rs. 5715.00 + Equipment Rs. 450.00 = Total Rs. 6165.00

buffalo management is also considered as an item to be costed, then labour becomes the most expensive item. It was found that 3—4 man hours per day have to be spent per herd throughout the year. On the other hand, if the value of buffalo working days, both own—work and custom work, is considered as an income to that family, it is apparent that an average size buffalo herd generates income sufficient to cover the cost of managing the herd. However, the profit was very low, and therefore buffalo husbandry under this management system is less attractive.

Advantages and Limitations of Buffalo Husbandry Under the Semi—Free Grazing System:

When the major characteristics of the buffalo husbandry under the semi—free grazing management system are evaluated in relation to the major characteristics of the traditional rural agrarian system, it is considered that the buffalo husbandry under this management system is consistant with the traditional rural agrarian economy in which this system is practised. The traditional rural agrarian economy is characterised by the abandance of low—income small farmers and landless people, lack of income generating opportunities, and excess labour. Therefore, such an economy needs enterprises which utilize less capital, less land, and much labour. It seems that buffalo husbandry under this management system has been a suitable enterprise for the rural agrarian economy because under this management system, buffalo husbandry utilizes less capital and less land (own—land) but much labour. As it has already been pointed out that since cash cost of feeding is almost zero under this management system, total cost of buffalo rearing is very much lower than the other improved management systems. It was found that 74% of buffalo holders during the cultivation period and 89% of buffalo holders during the non—cultivation period grazed their animals on the lands which do not belong to themselves. Under such a system, very small land holders and even the landless people are able to keep buffaloes, and to earn their living. Furthermore, under this management system, animals are grazed mainly on the non—utilized lands such as road—sides, fallow paddy fields and some uncultivated public lands, and underutilized space under coconut palms. Therefore, in rural area where non—utilized and underutilized lands are available in large extent, this buffalo management system provides an opportunity to utilize these lands productively, and also this is the only way in which the small farmers and landless people could utilize such lands which do not belong to themselves, since they are not otherwise allowed to directly utilize the others' lands. Therefore, buffalo husban-

dry under this management system provides an opportunity to very small farmers and landless people to utilize a greater extent of land than that they actually own. This management system is particularly suitable due to the zero cost of feeding because the animals are used for farming purposes only a very short period, and during the rest of the year where the animals are not utilized for any income—generating purpose, they have to be maintained with a minimal cost.

This buffalo management system is not sustainable in the long run in view of the fact that uncultivated lands on which animals are grazed under this feeding system, are increasingly becoming scarce as population pressure on land also increases. Shortage of grazing grounds has already become a serious constraint in the study area due to the expansion of cultivated area, and land fragmentation. It was found that the increase in the extent of land under crops is one of the major reasons for the ex—buffalo owners to give up the buffalo husbandry (Table 4). The expansion of the cultivated area in turn limits the extent available for grazing and makes it difficult for buffalo holders to keep their animals away from the cultivations. In the past, the cultivatiors were required to look after their crops more closely than the buffalo and cattle owners were required to watch their animals grazing on the uncultivated lands, and hence the farmers were required to erect strong fences encirling their farms to keep off the roaming animals.

TABLE 4

Reasons for Giving up Buffalo Husbandry by Ex—Buffalo Holders

Resons	First Reason %	Second Reason %	Third Reason %
Scarcity of uncultivated lands for grazing	50	29	33
Lack of family labour and physical weakness caused by old age	25	57	08
Buffaloes are unnecessary due to tractors	18	14	50
Buffaloes were sold out due to the urgent need of money	07	00	00
Buffalo theft	00	00	00

This arrangement was necessary because apparently it was the same owners of the crops who owned the buffaloes and cattle as well. Today, many well off farmers have shifted from draught animals to tractors, leaving draught animals to the poor category of farmers. Now, instead of conventional practice of constructing strong fences to protect crops from the village buffaloes and cattle, the farmers build less strong fences and expect the owners of the animals to grard their animals from breaking into such farms. Once a crop damage occurs, the administration acts in favour of the cultivator. Under these situations where the extent of cultivated lands expand, and when the cultivators expect the owners of animals to guard their buffaloes, buffalo husbandry under this management system becomes less practical.

Utilization of draught power is limited to the very short cultivation period, and during the non—cultivation period in which animals are not used for any income—generating activity, the buffalo holders just want to keep their animals alive at a minimal cost until the beginning of the next cultivation period. Therefore, sufficient attention is not paid to maintain the nutritional level and health conditions of animals at a satisfactory level. In consequence, quality and productivity of the animals become poor. During the dry season, apart from the food and water shortage, there is the danger of sickness and epidemics. Consequently, at the beginning of the cultivation season when animals are needed to draw the plough, they are not able to generate sufficient power owing to their poor physical conditions.

Even if genuine efforts are made to promote the quality and productivity of animals by improving health, sanitation and breeds, this traditional management system would be a constraint because under this system such programmes cannot be successfully implemented. For instance, in a situation where animals graze freely as most of the herds behave on fallow paddy fields under the current buffalo management system, up—breeding programmes or effective disease preventive measures cannot be succesfully implemented. Also proper medical care cannot be given when there is a poor control over the animals particularly during the fallow period. Some case studies in India where a similar buffalo management system is in practice, point out that high calf mortality is caused by lack of shelter, by worms or by infections resulting from poor management (Camoens, 1976; Arora, 1977). It has been found that the calf mortality in the survey area under this management system is considerably higher than that in Itally where buffalo management is done under the stall feeding system (Sastry and Gall, 1985). Here in Sri Lanka, there is little incentive for

calf rearing because the need for replacement stock is not great owing to long life—span of buffaloes, and there is no practice of rearing buffaloes for meat production. Under this management system, animals have to walk a long distance in search of water and green fodder, thereby loosing weight due to the amount of energy needed in its search in the hot sun for palatable grasses and water. This is particularly true during the droughts.

Under this management system, buffalo holders depend exclusively on costless natural feeds for feeding their animals. It has been pointed out that the naturally available fodder is not well balanced, and therefore exclusive dependance on natural fodder causes poor growth and low productivity. Under Sri Lankan conditions, the sodium content of pastures and residues in extreamly low and hence supplementation with salt is vital for working and non—working animals (Ibrahim, 1985). Therefore sole dependence of animal feeding on nutural pasture, as it is practised under the existing system, is not satisfactory. Furthermore, it has been found that under this system, buffalo herds are left to depend solely on naturally available water for drinking and wallowing. All these sources of water supply such as irrigation canals, irrigation reservoirs, *patahas*, and wells dry out during the long dry season, and therefore water supply becomes a severe constraint to animals as well as human beings. This problem negatively affect the animals productivity.

It has already been pointed out that buffalo husbandry under this management system is less attractive enterprise due to its low income generating capacity. Therefore, young generation is reluctant to adopt the buffalo husbandry as their occupation. In consequence, now buffalo husbandry is left to the old aged people. It seems that after the present generation, there would be a few to undertake the buffalo husbandry. When the old aged buffalo holders become physically too weak to manage their animals, they will have given up the buffalo husbandry because their young sons are not prepared to take up their fathers' occupation. Table 4 shows that most of the ex—buffalo holders have mentioned that their physical weakness caused by age as a second reason as to why they have given up buffalo husbandry. Therefore, it seems that there is no future for buffalo husbandry under the current management system. Therefore, it can be said that although the semi—free grazing system has been a suitable system in the past, under the present situation the semi—free grazing system is no more practical.

Conclusion

Therefore, if buffalo husbandry is to be revived, an alternative approprite buffalo management system has to be introduced. Such an alternative system should have the following characteristics.

- Should not exclusively rely on natural parture on uncultivated lands which are increasingly becoming scarce.
- Should have a proper feeding system which could feed animals with a balanced diet throughout the year.
- Should utilize animals throughout the year for a wide range of income generating ways.
- Should be capable of enforcing proper control over health, sanitation and breeding etc.

The stall—feeding system under which animals are kept in and fed with cut—grass, crop residues and fodder tree—leaves seems to be an appropriate management system. However, since the high capital and labour requirement involved in such a system, it would not be acceptable to the low—income small farmers unless income generating capacity of buffalo husbandry is increased. Therefore, more income generating measures have to be adopted in association with the introduction of the stall—feeding system.

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