*Indian Journal of Extension Education*
*Vol.46, No. 3 & 4, 2010 (48-52)*

# Rural Envoirment vis-a-vis Buffalo Husbandry: A Factor Analysis

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## ABSTRACT

The study was conducted in four districts of Murrah tract in Haryana. The sample constituted 200 farmers, 50 scientists and 50 veterinary surgeons. The buffalo husbandry practices, which affect rural environment, were identified. Based on the perceptions of farmers, scientists and veterinary surgeons 34 environmental problems related to buffalo husbandry were identified. The response of scientists and veterinary surgeons for these problems was elicited on 5 point continuum and was subjected to factor analysis. On the basis of this analysis 6 factors which contributed significantly to the variance were finally identified. Changing paradigm of development demands increasing concern about environmental degradation. Environmental pollution is a very serious threat to mankind. Its gravity in urban areas and industrial belts has been widely recognized. However, its problems in rural areas where still more than two third population of the country lives, has failed to get the attention. There may be several reasons for this problem in the villages, which may vary from region to region depending upon agro-climatic conditions, geographic location, socio-economic status etc.

Buffalo is a predominantly milch animal in Haryana and the number of breedable buffaloes is approximately 2.5 million. Rai (2007) reported that agriculture sector contributes 28 per cent of the total Green House Gas emissions in India. It is primarily due to emissions of methane gas from rice fields and ruminant animals. Buffaloes contribute in aggravating this problem in Haryana. Therefore, it was felt very important to know the effects of various buffalo husbandry practices on environment. The problems emanating from buffalo husbandry were identified by studying the existing management practices followed by the farmers in the Murrah tract and perception of scientists and field veterinarians about buffalo husbandry vis-a-vis rural environment were ascertained and data were interpreted on the basis of results of factor analysis.

## METHODOLOGY

The study was conducted in four districts of Murrah tract in Haryana namely, Hisar, Rohtak, Jind and Bhiwani. One block was selected randomly from each district and later on one village was selected from each block randomly. At the last stage 50 farmers were selected from each village through proportionate random-sampling on the basis of number of buffaloes possessed by them. Thus, 200 farmers constituted the study sample. Data were collected for eight independent variables which were measured with the already existing scales.

The scientists working in Haryana Agricultural University (HAU) and ICAR institutions namely; Central Institute for Research on Buffaloes (CIRB) and National Dairy Research Institute (NDRI) located in Haryana in the field of animal sciences and having at least ten years of experience comprised the population of the study. From this population 50 scientists were selected randomly. Similarly 50 veterinary surgeons having atleast 10 years of experience, working in the same four districts were also selected randomly.

### Identification of environment problems

Existing management practices followed by the farmers in Murrah tract of Haryana were studied. On basis of these existing practices list of practices which could affect the rural environment were identified. The list was further consolidated by doing extensive review of literature, discussion with animal scientists, environment scientists, field functionaries, administrators and farmers. A pilot study was conducted to make this list comprehensive and complete. After thorough editing 34

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environmental problems emanating from buffalo husbandry were identified for eliciting the response of the respondents selected for this study. The schedule was administered to scientists and veterinary surgeons for getting their response on problems emerging from buffalo husbandry and their deleterious effect on rural environment. The response was collected on 5 point continuum from 'most serious' to 'not at all serious' and these were scored 5 to 1 respectively. Thus, the scores of all the respondents for different buffalo husbandry related problems identified were subjected to factor analysis.

The factor analysis was done with Principal Component of factoring (Hotelling, 1933; Kelly, 1935) by computer. Factors were rotated by 'Varimax Rotation Method' suggested by Kaiser (1958). The inferences were drawn on the basis of factor loadings (>.30) in the final factor loading matrix as was used by Rizzo et. al. (1970). The interpretation as, however, guided by factor loadings as classified by Frutcher (1954).

## RESULTS AND DISCUSSION

Profile of respondents was studied with regard to important variables of farmers and is presented in Table-1. It is apparent from the table that average age of respondents was 40.41 years. Their level of education as well as family education was low to medium in general. Average land holding size of respondents selected for the study was 5.62 acres. Majority of respondents belonged to middle category of castes. Average herd size of farmers in four selected villages was 4.00. Their extension contact and media exposure was moderate. A sizable proportion of respondents had favourable attitude towards buffalo husbandry.

It is still widely believed by the animal scientists and veterinary surgeons that buffalo husbandry is sustainable as it has been practiced by the farmers since generations.

However, few reports have suggested that livestock accounted for 15-20% of global methane emissions. It was also revealed that methane concentrations have also steadily increased at a rate of about 1 % per year in recent decades. Thus for further colloboration that buffalo husbandry affects the rural environment, responses of scientist and veterinary surgeons were elicited on 5 point continuum. The data were subjected to factor analysis. Factor analysis yielded six factors which significantly influence the rural environment. The factors with their factors loadings and variance contribution are presented in Table 2. The contents and nature of each factor have been described below:

**Table 1: Profile of farmers**

| Variables | Range | Mean | SD |
|---|---|---|---|
| Age (years) | 22-62 | 40.41 | 10.43 |
| Education | 0-6 | 3.17 | 1.80 |
| Herd size | 1-12 | 4.00 | 2.17 |
| Land holding size (acres) | 0-18 | 5.62 | 4.92 |
| Family education | 0-8 | 2.66 | 1.67 |
| Extension contact | 8-40 | 16.53 | 7.57 |
| Media exposure | 9-27 | 13.89 | 5.10 |
| Attitude towards buffalo husbandry | 7-24 | 12.18 | 4.39 |

### Improper housing

This factor was considered most vital as it caused about 34.2 percent variation. The practices falling in this factor are: large concentration of animals in villages and providing less space (0.70), animals are kept in the same house with human beings (0.55), housing of animals not done as per recommendations (0.34), and improper cleaning of sheds as dung is drained in pond (0.33). This study revealed that more than half of respondents (56%) were not having appropriate sheds for animals and they were not kept as per recommended space. Moreover a sizeable proportion of respondents (52%) kept their animals in home. Thus in order to minimize the effects of buffalo husbandry on rural environment farmers may be dissuaded to keep the buffaloes in the same house where they live and animals may be housed with sufficient space as per recommendations.

### Animal disease

This was second most important factor as it contributed about 23.2% percent variation. This factor contained following practices like; spread of diseases like TB and brucellosis from buffaloes to human beings (0.66), village pond is a source of bacterial, viral and parasitic

diseases (0.57), farmers take sick buffaloes for wallowing (0.51), during the outbreak of diseases like FMD, HS recommendations of scientists are not followed (0.48), diseases like brucellosis, TB, can spread to human beings by consumption of raw milk (0.39), farmer, do not segregate sick animals from healthy ones (0.38) and Vaccinations not done against serious diseases (0.31 ).It was also noticed during this study that 74% farmers offered water to their animals at the village pond which is not desirable. It is, therefore, imperative that suitable practices are followed and spread of disease from buffaloes to humans and from animals to animals is minimized.

**Poor hygiene**

Hygiene was the third most critical factor which caused about 17.2 percent variation so for as opinion of scientists and veterinary surgeons about environment problems emanating from buffalo husbandry was concerned. Problems identified on the basis of factor loadings were; improper disposal of dung (0.55), bedding of animals not changed completely and no disinfectants used (0.53), use of dung as fuel for cooking causes health problems in ladies due to smoke (0.41), stray animals are not castrated (0.36), water of village pond remains unchanged for long period (0.35) and improper disposal of aborted fetus, placenta and uterine discharge (0.32) It is thus obvious that some of the practices followed by the farmers are unhygienic. Therefore, to avoid undesirable effects of buffalo husbandry on rural environment proper hygiene is very important Poor awareness about environmental issues Lack of awareness about environment issues vis-a-vis buffalo husbandry was also one of important factors as it contributed about 10.2 percent variation. The problems emerged due to this factor were; land, water and air is being polluted due to animals husbandry (0.58), burning of crop residues instead of feeding to animals polluted the environment with the smoke in the villages (0.47), animal husbandry causing GHG emissions (0.34) and global warming (0.33) and large piles of dung in villages led to emission of methane gas (0.33). Shrivastava (2009) reported that there is an emission of 80to 100 g of methane daily from an adult buffalo, therefore, it can have deleterious effect on the health of human beings if 3t04 animals are kept at home. Awareness about environmental issues is the need of the hour as every country has to control its GHG emissions. This is particularly significant for a country like India which has 98 million buffaloes

**Poor nutrition**

This was also important factor as it lead to about 8.2 percent variation. On the basis of factor loadings the statements identified were; animal feeds not stored in dry places get infected with aflatoxins (0.57), unscientific feeding in animals (0.48), and wheat rice crop rotation cause depletion of minerals in soils, plants and animals (0.32). 'Poor feeding practices in buffaloes also affect the environment. Roy and Upadhaya (2007) reported. That methane emission with expired air is not uniform and factors that affect fermentation are feeds, composition of feed and rumen activity effect. It was also observed that fibrous diets enhanced methane production in buffaloes.

**Miscellaneous factor**

The factor caused 7 percent variation. These were primarily due to unscientific buffalo husbandry practices followed by the farmers like; excessive use of diclofenac sodium medicine may result into death of vultures when they eat animal carcasses (0.33), animal urine contains urea and its nitrate subject to leaching into surface or ground water (0.32), farmers do not treat and bury the animal carcass as per recommendations (0.32), increased use of insecticides lead to more toxicity in the milk (0.31), dogs and cats pick up infection by eating infected carcass (0.31), panchayat bulls are not screened for diseases (0.31), soil erosion is caused by the animals duo to grazing in the field (0.30), problem of fecal coliform bacteria increasing in surface water due to animal husbandry(0.30) and bedding of dead animals not removed (0.30). Therefore, ill effects of buffalo husbandry on rural environment can be reduced considerably if farmers follow appropriate management practices.

Critical appraisal of the problems identified in the study revealed that they resulted due to faulty management practices. For example animal housing not done as per recommendation, farmers do not segregate sick animals, sick buffaloes are taken for wallowing, improper management of large concentration of buffaloes in villages, animals are kept in the same house where human beings live etc. Sohal (1985) and Acharya (1990) also reported similar observations. All these faulty practices affect the environment. Some times tying of diseased animals near healthy ones infect them also. Village pond also is a source of infection if diseased animals are taken for wallowing. Similarly keeping animals along human dwellings may be a source of infections. Similar findings emanated from the study of Trinidade (2005) who reported that several measures like animal housing, slurry storage facilities, grazing

management etc need to be adopted to reduce environmental problems. Rivers et. al. (2004) also felt that there was a need to address environmental problems for the development of sustainable dairy farming system. Groot et at (2004) reported that comparisons of farming systems demonstrated that they can be designed in such a way that improvement of internal nutrients cycling supports the same animal production level with lower inputs and lower emissions. King et at (2007) found no detrimental effects on environment in case of organic dairy farms. However, as dairy farms become more intensive there was adverse impact on local and wider environment.

**Table-2 Factor analysis of environmental problems emanating from buffalo husbandry**

| Sr. No. | Envoirmental Problems | Factor loadings | Percentage Variation |
|---|---|---|---|
| **Improper housing factors** | | | 34.2 |
| i) | Large concentration of animals or less space in animal sheds cause rural pollution | 0.70 | |
| ii) | Animals are kept in the same house where human beings live | 0.55 | |
| iii) | Housing of animals not done as per recommendations | 0.34 | |
| iv) | Improper cleaning of sheds as dung is drained in ponds | 0.33 | |
| | **Animal disease factor** | | 23.2 |
| i) | Spread of diseases like TB and brucellosis from buffaloes to human beings | 0.66 | |
| ii) | Village pond is a source of bacterial, viral and parasitic diseases | 0.57 | |
| iii) | Farmers take sick buffaloes for wallowing | 0.51 | |
| iv) | During the outbreak of diseases like FMD, HS recommendations of scientists are not followed | 0.48 | |
| v) | Diseases like brucellosis, TB, can spread to human beings by consumption of raw milk | 0.39 | |
| vi) | Farmer do not segregate sick animals from healthy ones | 0.38 | |
| vii) | Vaccinations not done against serious diseases | 0.31 | |
| | **Poor hygiene factor** | | 17.2 |
| i) | Special attention not paid for proper disposal of dung and urine which may lead to spread of diseases | 0.55 | |
| ii) | Proper attention not paid to animal bedding | 0.53 | |
| iii) | Smoke of dung causes diseases in ladies | 0.41 | |
| iv) | Stray animals are not castrated | 0.36 | |
| v) | Water of village pond if not changed regularly may lead to diseases | 0.35 | |
| vi) | Improper disposal of aborted fetus, placenta uterine discharge | 0.32 | |
| | **Poor awareness about environmental issues** | | 10.2 |
| i) | Due to animal husbandry land, water and air is being polluted | .58 | |
| ii) | Burning of crop residues causing environmental problems instead of using for animals | .47 | |
| iii) | Animal husbandry causing GHG emissions | .34 | |
| iv) | Large piles of dung in villages lead to emission of methane gas | .33 | |
| v) | Animal husbandry causing global warming | .33 | |
| | **Poor nutrition factor** | | 8.2 |
| i) | Animals feed not stored in dry places and get infected with aflatoxins | .57 | |
| ii) | Unscientific feeding in animals | .48 | |

| | | | |
|---|---|---|---|
| iii) | Wheat-rice crop rotation causes depletion of minerals which affects animals | .32 | |
| | **Miscellaneous factors** | | 7.0 |
| i) | Medicines like diclofenac sodium may result death of vultures when they eat animal carcasses | .33 | |
| ii) | Animal Urine contains urea and its nitrate subject to leaching into surface or ground water | .32 | |
| iii) | Farmers do not treat and bury the animals carcass as per recommendations | .32 | |
| iv) | Due to increased use of insecticides more toxicity in the milk | .31 | |
| v) | Dogs, cats pick up infection by eating infected carcass | .31 | |
| vi) | Panchayat bulls are not screened for diseases | .31 | |
| vii) | Soil erosion is caused by the animals due to grazing in the field | .30 | |
| iii) | Problem of fecal coliform bacteria increasing in surface water due to animal husbandry | .30 | |
| ix) | Bedding of dead animals not removed | .30 | |

## CONCLUSION

The study identified six most significant factors of buffalo husbandry which could seriously affect environment. Farmers need to be motivated to follow practices which considerably reduce the effect of buffalo husbandry on rural environment. For example they may be advised not to drain dung into village pond, avoid keeping animals in the same house where they live, maintain proper hygiene by constructing proper sheds, keeping cleanliness in sheds, burry dead animals properly, avoid consumption of unboiled milk. Farmers may also be advised not take sick animal to village pond, segregate sick animals from healthy ones. Thus by following very simple practices ill effects of buffalo husbandry on rural environment could be considerably reduced. Younger farmers with better education, extension contact and mass media exposure could act as key communicators in this endeavour. The Animal Husbandry Department as well as other institutions related with Buffalo husbandry should also take up extension programmes to educate farmers about the gravity of the problem affecting their health and environment.

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