Social-cultural barriers to the adoption and transfer of technologies in the livestock sector of the Western Highlands of Cameroon

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ABSTRACT

This paper discusses some of the socio-cultural barriers to the transfer of technology with particular reference to the livestock sector of the Western highlands of Cameroon. The study is based on primary data collected through a structured questionnaire and secondary data obtained from various government sources. The analysis shows that the lack of permanent grazing, the perceived negative impact of vaccines, and ethnic conflicts are major barriers to the adoption of livestock technologies in the region. This paper stresses the need for improvement in government policy in the area of animal production, especially with regards to grazing lands, in order to promote sedentary behaviour among herders. Appropriate policies would facilitate the adoption of livestock technologies by cattle owners and shepherds, and improve livestock production and productivity in the region.

Key words : Appropriate policies ; Social-cultural barriers ; Livestock technology ; adoption, Western Highlands ; Cameroon.

RÉSUMÉ

Cet article porte sur certains obstacles socioculturels au transfert de technologies dans le domaine spécifique de l'élevage dans la zone des grassfields de l'Ouest-Cameroun. L'étude s'appui à la fois sur des données primaires collectées sur le terrain au moyen d'un questionnaire structuré et sur des données secondaires obtenues à partir de diverses sources (documents de l'administration et des organismes non-gouvernementaux). De l'analyse de ces données, il apparaît que le manque de pâturages permanents, la perception négative de l'impact des vaccins et les conflits ethniques, constituent un ensemble d'obstacles majeurs à l'adoption de technologies d'élevage dans la région. Ceci indique la nécessité d'améliorer la politique gouvernementale en matière de production animale en général et, plus spécifiquement dans le domaine de la production animale, en vue de sédentariser les éleveurs. Un ensemble de mesures adéquates faciliteraient l'adoption des technologies appropriées par les éleveurs traditionnels, et contribuerait au relèvement du niveau de la production animale dans la région.

Mots clés : Politiques adéquates ;Obstacles socioculturels ; Technologies d'élevage ; Adoption ; Hautes terres ; Cameroun.

The Western Highlands of Cameroon is the geographical region known as the Western High plateau which falls within the West and North-West Provinces of Cameroon. The region is characterised by its typical savannah relief and a high population density (Nji and Daouda, 1984). The increasing population density which has recently been estimated at 200-250 inhabitants/km² with peaks of up to 1000 inhabitants/km² (Téguia et al., 1997), is partly responsible for the continuous decline in the size of grazing land available for extensive animal production and efficient ruminant livestock management. The shrinking of land available for traditional cattle production has also increased the conflicts between crop farmers and grasiers (Nji and Harshbarger, 1991),

The increasing pressure on land and natural resources is an urgent call for an improved system of livestock production over the current practice of traditional grazing in the region . The promulgation of people-friendly laws and the creation of an enabling environment for peaceful cohabitation between cattle producers and food crop farmers are crucial for peaceful and sustainable development in Cameroon. This will also enhance government policy on human rights and good governance.

Unfortunately, government policy on livestock production has been slow in addressing this issue, and the entire livestock sector in Cameroon. Understandably, agricultural policy in Cameroon has weighed more on the side of crop than animal production. Ironically, crop producers tend to be the least protected in conflict situations involving them and animal producers. (Nji & Harshbarger, 1991).

This is complicated by what appears to be government preference to promote the interests of large-scale livestock producers and peri-urban agriculture in order to carter for the needs of urban consumers, such as making more beef and dairy products available to city dwellers and urban elites (Nuru, 1985 ; Wosu, 1983 ; Lamorde, 1993). For example, between 1972-1975, the government of Cameroon in collaboration with France and the World Bank created ranches at Dumbo (North-West Province), Ndokayo (East Province) and Faro (North Province). A number of technologies were transferred through the projects. These included tangible technologies (Nji, 1992) such as spray races and dips, a modern slaughterhouse in Maroua and a refrigerated slaughterhouse at Marouasalak. Cattle were transported from these ranches to the modern abattoirs in Douala and Yaqunde every week for processing (Manu, 1995). Non-tangible technologies (Nji,1992) such as training in beef handling and storage were provided for the benefit of urban consumers.

This paper examines some of the socio-cultural barriers to the transfer of technology in the livestock sector, with special reference to the Western Highlands of Cameroon, and invites dialogue and debate on the need for a more comprehensive and sustainable development policy in Cameroon's livestock sector.

METHODOLOGY

Study Area.

The study was carried out in the Western High Plateau, which covers the West and North-West Provinces of Cameroon. By its geographical features, the region is a cattle production area **par excellence**. This area was chosen because it has ideal conditions characterised by mountains and suitable rainfall for fodder production. It lies between latitude 5-7°N and longitude 9-11°E. The altitude range from 1400 m.a.s.l; to 2740 m.a.s.l in the Menoua Division in the West Province, to 2888 m.a.s.l. on the Ijim Plateau in Boyo Division, with a peak of 3008m on Oku Mountain, both in the North-West Province. The annual temperature ranges between 13°C and 21°C, dropping sometimes to about 7°C at the summits of Bamboutous and Oku mountains. These mountain ranges act as watershed for most of the rivers (Manu, 1995).

Data were collected from parts of Mezam, Bui, Boyo, Donga-Mantung and Ngokitungia Divisions. Ngokitungia was particularly suitable for the study because it is the traditional area for dry season grazing for most herders from Mezam, Bui and Boyo Divisions. Shepherds would graze their cattle in the Ndop plains and water their livestock in Bamendjin dam. Although Menoua does not have a large number of breeders, it has an ideal climate for cattle and goat production. Its high population density (about 700 inhabitants/km²) is a contributing factor to land scarcity in the Division.

The extraordinarily high development of food crops (*salanuum potatoes*) and vegetables such as cablages, carrots, leaks, green beans etc. in the Division virtually pushed the herders off the land into other Divisions.

The primary data were obtained from pastoralist heads of household. A household head in this study is the owner of the cattle, who also makes all final decisions about the household. Natives who are not traditional grazers were not included in the sample. This is because we want in this exploratory study to determine the attitude of fulbe grazers to technology adoption and to later compare them to other races.

Sampling

The sampling frames of the pastoralists household heads were obtained from the traditional headman of the group, known as "Ardo". Apart from providing leadership for the community, an Ardo is in-charge of evaluation of cattle and the collection of **Jangali** taxes on cattle herds from cattle owners. A Jangali tax is a government levy of 350 CFA* per head of cattle per year.

Out of 150 questionnaires administered to heads of households, 100 (67%) were considered suitable for analysis. Those not included in the analysis were rejected for incomplete data. Seventy percent of the sample came from the North-West Province and 30 % from the West Province, proportionate to the density of pastoral activity in the two provinces.

Participant observation was also used to observe the behaviour of family members in livestock grazing. The primary data were collected using a questionnaire and personal interviews administered to heads of household. Secondary data were collected from published government documents and other sources.

THE RESULTS

Socio-cultural characteristics of the respondents.
The mean age of respondents was 36 years and the range was from 18 to 65 years, as presented on Table 1.

As Table 1 shows, 0,5 % of the graziers are below 21 years, and the same number above 51 years. Seventy percent are young between 21-40 years. This would augur well for technology adoption and transfer, *other things being equal.*

As Table 2 shows, 75 % of the respondents are literate only in Arabic. This implies that if technologies are to be introduced to them, the language of communication must be Arabic or Pidgin English , which is the **lingua franca** among farmers in the area.

A small number (08 %) of the respondents have attained from secondary to post secondary school level education, and can serve as "bridges" or facilitators in technology transfer to their kith and kin.

Awareness and adoption of improved livestock technologies.
A number of livestock practices (technologies) had been introduced in the area by Government veterinary agents in the past. Table 3 shows that eighty percent of the respondents were aware of the existence of vaccines, and 75 % of them vaccinated their cattle regularly. However, although sixty percent of the re-

Table 1 : Distribution of Grazers in the sample by age

Age range (years)	N° of respondents	% of total
11-20	05	05
21-30	30	30
31-40	40	40
41-50	20	20
>51	05	05
Total	100	100

Source : Survey data

Table 2 : **Level of education of respondents (= 100)**

Level of education	N° of respondents	% of total
Koranic	75	75
Primary	17	17
Secondary	05	05
Post-secondary	03	03
Total	100	100

Source : Survey data

US$1 = 550 in April 2004

spondents were aware of the use of supplementary feedlot, only 33.30 % of them had adopted it.

The table shows an interesting pattern of variation between awareness of a technology and its adoption. Of the 50 % who know about ranching, only 33,3 % practised the technique because, according to them, it is a costly technology and requires a lot of self discipline. Of the 90 % aware of the use of paddocks, only 67% adopted the technology because of lack of enough grazing land. Twenty percent less grazers adopted crossbreeding compared to the number who were aware of it. There was a similar drop in adoption of fodder banks due to several technical factors. However, they planted Guatemala grass (*Trypsacum laxum*), Bracharia (*Bracharia spp*) and kikuyu grass (*Pennisetum clandestinum*) to feed cattle in times of fodder scarcity, or the season they call "Seedu" in their indigenous knowledge categorisation of livestock production seasons.

Although only 60 % of the respondents were aware of modern technologies used in dairy processing, respondents explained that they were encouraged to adopt the technologies because of the immediate benefits derived from it. For instance, their diets depend on dairy products, particularly milk and butter. However technologies that required additional investments in money and time, and those that entail major changes in farming practices were and are harder to adopt. All the respondents stated lack of permanent grazing land as a major constraint to the adoption of livestock technology. Conflicts over land with other owners particularly natives who are not traditionally cattle breeders was disclosed as a barrier to adoption by 60 % of the respondents This is consistent with the age-old discovery in agricultural research that farmers will be reluctant to adopt new technologies if they do not own the land over which the technology is to be introduced.

Lack of skills to manipulate improved livestock technologies was identified as a major constraint to adoption by 40 % of the grazers. This affirms earlier findings by Nji and Daouda (1990) that technical factors are serious barriers to adoption and transfer of technologies in fish farming. It is not enough to tell people about a technology, it is more important to teach them how it works, how to use it, and its benefits to the

Table 3 : Distribution of respondents according to levels of awareness and adoption of improved livestock technologies in the study area (N=100).

Innovation	Grazers aware	Adoptors as % of those aware	% Difference between adoption and awareness
Vaccination of cattle	(80%)	60 (75%)	-5.00
Feedlot	(60%)	20 (33%)	-26.70
Pasture Conservation	(70 %)	40 (57%)	-12.90
Grazing reserves	(50 %)	10 (20%)	-30.00
Ranching	(60%)	20 (33.3%)	-26.70
Paddocks	(90%)	60 (67 %)	-22.30
Crossbreeding	(100%)	80 (87%)	-20.00
Artificial insemination	(40%)	10 (25%)	-15.00
Dairy processing	(60%)	50 (83%)	+23.30
Fodder bank	(80%)	50 (62.5%)	-17.50

Source : Survey data

Table 4 : Major Barriers to technology adoption and transfer in the livestock sector as reported by respondents (N=100).

Major constraints	N° of respondents	% of total
1. Lack of Permanent grazing land	100	100
2. Frequent outbreaks of epidemics	80	80
3. Ethnic conflicts	60	60
4. Lack of access to drugs	60	60
5. Perceived Negative effects of vaccines	50	50
6. Lack of skills to use improved techniques	40	40

Source : Survey data

adoptor, in order to achieve voluntary acceptance and continuous use.

To do this, extension or outreach must accompany all technology transfer efforts on a permanent basis. Meanwhile, frequent epidemics, and perceived or/and actual negative effects of vaccines or drugs on cattle, and lack of access to medical facilities were decried as serious barriers to technology adoption by 80 % of the respondents.

Here again, lack of appropriate knowledge or ignorance of the side effects of some drugs may be at the root of resistance to technological change among breeders. Sometimes, the true negative effects of drugs on livestock might result not from the drug itself, but from the use of expired drugs or the improper preservation or treatment of vaccines as reported by Nji (1995).

Indigenous Knowledge

In this region the graziers use indigenous knowledge to identify five seasons in a calendar year relating to livestock breeding. This is a good example of the application of indigenous knowledge systems analysis, which is so critical to a better understanding and study of technology transfer in the agricultural sector.

The seasons are

1. **Ndungu** : This is the wet season characterised by heavy rains, and sufficient pasture and water for cattle. This period begins in July and ends in September, corresponding to that time of the year when cattle are fed in their permanent grazing areas prior to transhumance.
2. **Yamnde** : This is the "hot season" from October to December after the harvest season. At this time, cattle graze on farmland and feed on crop residues.
3. **Dabbunde** : This is the "cool dry season" which coincides with the harmattan prevalent in the sahel region. It begins in January/February, when shepherds begin transhumance. During this period pasture and water supplies for cattle are scarce due to lack of precipitation which forces many rivers to dry up or drastically reduce their flow.
4. **Seedu** : This is the "hot dry season" when the vegetation and water is almost completely dried up. The health of the livestock becomes precarious leading to serious weight loss in all animals, particularly cattle. It is at this time of the year that the mortality rate of livestock is highest. This period runs from February to March and sometimes April depending on the rainfall pattern for that year. This is the most difficult period for livestock rearing in the region.
5. **Seehto** : This period marks the beginning of early rains begins in April/May, and is characterised by movement of cattle back to their rainy season camps. This may extend to June depending on the date of early rainfall.

It is to be noted that crop farmers begin land preparation between January and February in readiness for planting by mid-March or as soon as the first rains fall. This requires careful management of governance principles and procedures to avoid social and territorial conflicts between farmers and grazers.

DISCUSSION

Age is an important variable in adoption. It has been established by numerous agricultural research on adoption behaviour that older farmers have a higher risk aversion than younger farmers. Also, middle-aged farmers tend to be high adopters because many of them might have made personal investments for which they expect rewards. It is not surprising therefore, that the majority of the respondents who adopted various livestock technologies fall within the middle age group. These people, who have inherited cattle from their parents are the most active in cattle rearing, and tend to positively influence their parents in farm decision-making.

The low level of formal education in English or French among the grazers results from their residence in isolated farmsteads on the mountains where institutional social amenities such as schools are completely absent. For example illiteracy rate was particularly high for farmers from Ijim Plateau who live in very remote areas or hamlets, as a coping mechanism to avoid social and territorial conflicts with farmers over grazing land. The predominance of literary in Arabic ought to be seen as an asset, and the herders assisted to adopt new technologies in Arabic. Koranic education is compulsory in Moslem Communities, as a key instrument and vehicle for socialisation and social control.

The recent conflict in Wum in the North-West Province where women held a Fon (village head) hostage in his own palace for more than one month (CRTV 2003) is a clear manifestation of the seriousness and perpetuation of social conflicts between farmers (who are predominantly women), and grazers (who are predominantly men). Appropriate policies and institutions

are urgently needed to address these issues (Nji, 1992) particularly at this time when governance, human rights democracy and globalisation are high on national and international agendas.

CONCLUSION

Technology transfer and adoption has been a chronic barrier to the development of Cameroon's livestock sector. The lack of inputs such as drugs, inadequate facilities for their transportation to, and preservation in rural areas due to poor road infrastructure, lack of electricity and inadequate personnel, are areas for urgent concern. Water scarcity for human, domestic and agricultural purposes is a growing threat to the development of plants and the survival of humans and livestock. This can be addressed through the promotion of suitable forms of water harvesting (Nji and Fonteh, 2002).

Inadequate and insufficiently trained personnel and the low level of extension in Cameroon's livestock sector conspire to greatly retard its development and stifle its potential contribution to poverty alleviation. The need for effective participation of animal producers in the globalisation and in the effective implementation of sustainable development strategies in the agricultural and rural development sector requires consensus and shared governance in the management of common resources such as land.

Farmer-grazer conflicts, and their resolution through peaceful means using good governance principles remain fertile areas for research and partnership building in Cameroon's academic and professional environments. The role of cattle fulanis and their integration into the main stream of change and development in Cameroon culture is as challenging as the struggle to bring the Baka pigmies into Cameroon's meting pot. These are cogent areas for further research and public policy.

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