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Analysis of ruminant's feeding systems in some Algerian farms: Obstacle to achieve autonomy

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Abstract. A survey of 30 farms belonging to five departments in east Algeria was carried out. The study of their feeding systems, demonstrated the low development of fodder production with 60% of farms reserving less than 50% of their agricultural area for these crops. Most of the land is reserved to cereal production which provides their feeding system with straw, concentrate and fallow. Forage productions are dominated by winter-growing grasses. Leguminosae is limited to the use of vetch grown in association with common oats. The feeding system is characterized by a low degree of autonomy with excessive use of dry forage at the expense of green fodder and silage. 90% of the surveyed farms have never used treatments to improve the nutritional value of their low quality forage and straw. According to 63.33% of farmers, the lack of outreach programs is the major impediment to the development of these treatments.

Keywords. Ruminants – Feeding systems – Forage production – Algeria.

Analyse des systèmes d'alimentation des ruminants dans certaines exploitations algériennes: les obstacles qui entravent l'autonomie

Résumé. Une enquête portant sur 30 élevages appartenant à cinq wilayas de l'Est algérien a été réalisée. L'étude des systèmes d'alimentation pratiqués, a démontré le faible développement des cultures fourragères avec 60% des exploitations réservant moins de 50% de leur SAU pour ces cultures. La majeure partie des SAU exploitées était réservée à la céréaliculture qui fournit paille, concentré et jachère pour l'alimentation des animaux. Les cultures fourragères sont dominées par les graminées à croissance hivernale. La culture des légumineuses se limite à l'apport des vesces cultivées en association fréquente avec l'avoine. La conduite de l'alimentation est caractérisée par un faible degré d'autonomie avec utilisation excessive des fourrages secs au détriment des fourrages verts et de l'ensilage. 90% des élevages enquêtés n'ont jamais utilisé de traitements d'amélioration de la valeur nutritive de leurs fourrages. Selon 63,33% des éleveurs le manque de vulgarisation constitue l'entrave majeure au développement de ces traitements.

Mots-clés. Ruminants – Systèmes d'alimentation – Production fourragère – Algérie.

I – Introduction

In a ruminant's production system, feeding the herd is the farmer's main concern. To daily feed his animals, the farmer is called to establish an effective feeding system through making strategic choices, from forage production to ration formulation (Agabriel, 2007). In Algeria, low forage production remains the major problem hindering livestock production (Benazzouz, 2001) Bad climate conditions and water shortages are not the only responsible of this situation, the incapacity of Algerian farmers to adopt new strategies to improve their feeding systems is also incriminated (Abdeldjelil, 2005) The survey conducted in our study will help to analyse ruminant's feeding systems in some Algerian farms, through evaluating the existing potentials and identifying obstacles to achieve autonomy.

II – Materials and methods

1. Farms

The studied sample includes 30 farms of mixed crop–livestock (sheep and cattle) farming system. The surveyed Farms belong to five provinces of eastern Algeria (Bordj Bou Arreridj, Sétif, Jijel, Mila, Constantine). The choice of the surveyed regions within each province was based on the importance of agriculture and ruminants breeding in the economic activity of the region.

2. Methodology

The survey was conducted during the months of February and March 2008. Data collection was based upon a detailed questionnaire of 22 questions of qualitative and quantitative nature. The questions cover two main subjects: forage cultures and distributed feed (nature, origin, quantities). Data collection was based on the responses of the farmers, our own observations and farm records when they exist.

III – Results and discussion

1. Predominance of small sized farms

The UAA (utilized agricultural area) which determines agricultural growth is small for most farms (Table 1). Half of them have less than 30 ha of UAA area and 23.33% of farmers are exploiting less than 10 ha. The small farmland size is a prominent feature of the Algerian agricultural landscape, making Algerian farms the smallest ones in the Maghreb region (Abaab *et al.*, 1995). This situation results of : the successive land reform policies that had limited private property (Chehat, 1994), land dispersal by multiple successions that reduce the size of exploited land through generations (Abdelguerfi and Laour 1997) and the urban growth that consumes yearly large areas of agricultural land (Saidi, 2000). The size of farmed land being small, the farmers are condemned to activate within the limits of their farms; with two major consequences: the reduction of their herd size and a change in their agricultural practices, promoting the most remunerative crops (cereals, vegetables) at the expense of forage culture which occupies lesser surfaces.

Table 1. Distribution of farms according to their UAA (ha)

Surface (ha)	[1-10 [[10-30 [[30-50 [[50-70 [Over 70
Percentage of farms	23.33%	26.66%	16.66%	13.33%	20%

2. Competition between cereal culture and forage crops

60% of farms reserve less than half of their UAA for forage crops. The most important part of the UAA is devoted to other profitable crops, mainly cereals which are present in 80% of farms and occupy more surfaces than forage cultures. Instead of forage, it's the association between cereal and livestock that represents the basis of agricultural activity. Cereals cultivated for human consumption contribute largely to the animals' feeding system providing it with straw, stubble, concentrate and fallow. According to Boulberhane's (1996) estimations nearly 60% of consumed UF (Unit forage) are supplied by cereal culture, 30% for concentrates and 29% for straw and stubble (Benazzouz, 2001).

3. Poor forage diversification

Due to the combined effect of forage monoculture and selective use of some species over others, forage crops are poorly diversified; with domination of two winter growing grasses, oat and barley, while summer-growing grasses are limited to corn. Leguminosae is limited to vetch grown in association with oats.

The association oats-common vetch culture is practiced by 83.32% of farms, a choice motivated by oat's low selectivity to soil, its modest requirements for fertilizer, and its adaptation to Mediterranean climate conditions (Figueireido Nunes 1989). Barley, the second most grown cereal after wheat in Algeria (Boumati, 2000) is practiced by 60% of farmers. Although some of its grain production is destined to human alimentation, barley provides the feeding system with green forage in early harvesting, a good quality silage and concentrate after grain maturation. Corn crop, is met in only 10% of the farms, like the other summer growing forages their weak presence is related to their water requirements, that a lack of effective irrigation systems curb the development.

4. Limited natural feed resources

Despite their low productivity and their variable nutritional value, fallows, remain the most used natural feed resource. Part of the agricultural rotation, fallow is practiced by all cereal growers and leasing fallow is a commonly used practice. The cereal- fallow rotation system remains the most common practice, in the absence of more productive systems such as ley farming, a system based on replacing unproductive fallow, by self-generating annual leguminosae (*Trifolium subterraneum* and *Medicago* spp.). This system practiced for several years in the South Australian wheat belt has proved to be effective in a region with a semi-arid, Mediterranean climate and an agricultural activity similar to ours, based on cereal culture and sheep breeding (Puckridge and French, 1983). This system (cereal - legume) is more beneficial compared to the cereal - fallow rotation, regarding, pasture, soil fertility, fight against weeds and insects, fight against erosion and a better integration of cereal culture and livestock enterprises.

Concerning the other natural forage resources, the contribution of rangelands is also low and often variable; many of them were replaced by profitable crops (Laour *et al.*, 1997) or consumed by the urban growth. The remaining areas have seen their productivity significantly reduced by overgrazing and successive years of drought.

We note finally, the complete absence of artificial grassland, a phenomenon considered by Mohguen *et al.* (1999), as a particular feature of the Algerian forage system. The introduction of artificial grasslands based on perennial grasses would enrich considerably the forage system and allow the replacement of unproductive spontaneous vegetation by high nutritional value plants.

5. Excessive use of dry forage at the expense of green fodder and silage

Aside from the small seasonal contribution of natural forage resources or the first cuts of cultivated forage (mainly barley), green fodder use, is limited to a short period of the year. The poor development of green forage results not only from water resource shortages; but also from the unavailability of appropriate seed (Abdeldjelil, 2005). The use of silage is also limited (only 1.87% of the surveyed farmers) this technique, although traditional, is very little developed, because of its poor mastery by farmers and lack of appropriate materials.

Animal feeding through most of the year is based on dry forages (hay and straw), mainly on vetch-oat hay, this traditional forage of cereal producing areas (Kayouli *et al.*, 1989) can give a fairly good quality hay (about 0.70 UF / kg DM) if stored under proper conditions (Abdelguerfi, 1987). Unfortunately, little attention is given while using it (exceeded cutting stage, bad storage conditions), which results in the production of a low quality hay (Benazzouz, 2001).

Cereal straw is used regularly by 54% of farmers; this crop residue occupies an important place in the feeding system. Like the case in other Mediterranean regions, the use of straw contributes on a small or large scale to feed animals, depending on the situation and degree of drought of the year (Nefzaoui, 1994). In good conditions straw is used to feed animals with low needs, but in extreme circumstances, it could be the only feed source with a possible addition of small quantities of barley or bran as a complement. This excessive use of dry forage induces two main consequences: the excessive use of concentrates with digestive or metabolic risks and high production costs.

6. Poor development of forage treatments

Low quality forage and the large amounts of straw provided by cereal culture are distributed without any treatment to improve their low nutritive value. 90% of the surveyed farmers have never used such treatments. Many farmers ignore their positive impact and those wishing to apply them do not master the technique. The majority of farmers (73.33%) believe that the lack of outreach programs is the major impediment to the development of these treatments. Other obstacles cited are purely of material nature, such as the unavailability of the treatment products and their excessive price when available.

7. Excessive use of concentrate

To compensate the low nutritional value of their dry fodder, farmers use large amounts of concentrate; this practice inherited from the period during which the state subsidized animal feed (Ferrah, 2000), induce high production costs, because the concentrate UF is generally more expensive than the forage one (Martial and Copin, 1987). Since cereals and their by-products are the main source of concentrate, their use for animal feed is in competition with the human alimentation. To reduce the tension on cereals, and reduce production costs the integration of agro- industrial byproducts would be an economic solution.

8. Low degree of autonomy

Since most farms grow cereals, 73.33% of them had total autonomy concerning straw supply. For hay supply, 40% of farmers turn to the market to cover all (13%) or part (26.66%) of their animals needs of hay. A high degree of dependency is recorded for concentrate supply; with 70% of farmers purchase all their needs of concentrate. This low degree of autonomy is a common situation in our farms, where in some cases; the rate of fodder self-sufficiency could cover only 27% of animal's needs (Farrah, 2000).

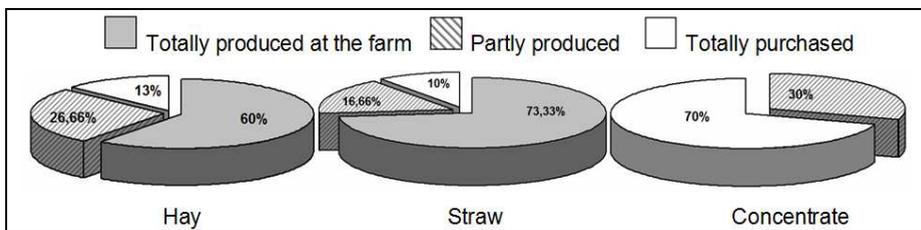


Fig. 1. Degree of autonomy for hay, straw and concentrate supply.

This dependency is explained, not only by the poor development of forage crops, but also by their average yields, their variable production from year to year, and their low nutritional value (Abdeldjelil, 2005). A situation due to the use of traditional farming techniques, wrong choice of cultivated species and bad climate conditions. Two major consequence of this state of

dependency is an increase in production costs and instability in animal's feed supply. Under such conditions, the farmer's main concern is how to ensure his herd's daily feed, quality and even quantity, become secondary to discontinuity which he tries to avoid.

IV – Conclusions

The study of the feeding systems in the surveyed farms showed a poor development of fodder crops, in terms of diversification and devoted areas. The limits of the forage system are responsible of a low degree of autonomy and excessive production costs. While some obstacles to achieve autonomy are insurmountable (small land size, bad climate conditions, water shortages); some simple solutions can be proposed to improve the situation such as abandonment of unproductive fallow in favor of ley farming, the development of forage nutritional value treatments and integration of agro- industrial byproducts into animal's feed.

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