

ANALYSIS OF ANIMAL HOUSING SYSTEMS IN TURKEY

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Abstract

Turkey has 11 million cattle and 27 million small ruminants according to the statistical data of 2009 which indicate high livestock production potential. Extensive applications are common throughout the country on dairy and beef cattle and also sheep and goat farming. Problems related to poor structural properties of animal shelters and failed to control of environment make negative effects on these farming applications. But in recent years with the increasing of the promoting livestock of the state, semi-intensive and intensive applications have become widespread. Although modern shelters are being built in these new farming applications, some design failures are caused the adverse effects on the animal welfare and hence animal production. Furthermore, manure management practices in big capacity farms have gained great importance in terms of human and animal health and also environmental control. Accordingly, buildings and facilities related to evolution of manure as biomass became a current issue in livestock farming systems.

In this paper, animal housing systems on cattle and small ruminant farming in Turkey were examined in terms of structural aspects. In this context, housing systems, milking systems and manure management structures and facilities were analyzed according to the structural design and mechanization. This analysis focused on the factors related to animal shelters to be taken into account for successful and sustainable livestock farming.

Keywords

Barn, shelter, manure management, mechanization.

Introduction

Turkey has especially suitable natural resources and ecological conditions for the production of cattle, sheep and goats; in the year 2009 it had 11 million cattle and 27 million sheep and goats (TUIK, 2011).

Stress originated by various factors can cause a reduction in productivity in animals by slowing down vital functions. The sources of such stress are principally climatic, physical and social factors. Of these, climatic stress can affect animals adversely through the climatic conditions under which they are housed, while stress from physical and social factors is directly related to the physical planning and design of the housing environment. Moreover, the type of planning and design has a direct effect on the creation of climatic conditions both within the housing and in additional structures (Ugurlu and Uzal, 2004).

Even though the genotype of the animals is very good, if the housing design and the environmental conditions where the animals are living are not suitable, productivity can never reach the levels desired. The main factors affecting animal productivity are 30% genetic and 70% from feeding, housing and

environmental conditions (Can et al., 2010). Research in this topic has shown by observation and examination that optimum productivity can be obtained in animal housing constructed and operated by taking into account project criteria, local conditions where the housing is constructed, and the type of animal rearing (Can et al., 2010; Bardakcioglu et al., 2004; Unal and Yilmaz, 2006).

As well as increasing animal productivity in the short term by arranging environmental conditions at optimum levels, an improvement in productivity can be obtained in future generations by improving the animals' genotype. For this reason, suitable environmental conditions must first be ensured in housing in order to understand the animals' genetic capabilities (Hellickson and Walker, 1983; Can et al., 2010).

Taking all of the above into consideration, it can be clearly seen that the type of design is of the utmost importance in the planning of animal production structures in order for production performance to be high and for a productive operation.

In this study, an analysis is made of housing systems recently constructed in Turkey for cattle, sheep and goat production. Housing, milking systems and waste management setups are evaluated with regard to structure and mechanization. At the same time, elements which should be taken into consideration in housing systems for successful and sustainable animal rearing are considered.

Cattle farming

Turkey has a pattern of agriculture mostly based on small family farms using mainly extensive production techniques. In this way, cattle farming are generally small-scale, and housing planning takes little account of local and climatic conditions. Farms with this kind of animal housing have significantly low productivity and cannot attain efficiency in feeding, milking and hygiene. In order to overcome these problems, a solution must be found to planning and infrastructure problems on these farms (Kaygusuz and Tumer, 2009; Can et al., 2010).

Structural characteristics for dairy cattle housing in the seven different regions of Turkey were determined in researches in recent years. The results are summarized in Table 1. In the most of the farms in research areas are closed type (76%) and have tie barn systems (67%).

In Turkey in general, closed and tie barn system is not recommended for dairy farming. In this type of housing in particular, problems emerge such as the inability to ensure environmental control or to make use of mechanization. A more suitable solution would be housing which would protect the animals from heat and the sun in summer and merely from rain in winter according to local conditions, and be constructed on an open or semi-open plan from light materials and orientated according to the prevailing winds of the area. This would be more suitable from the point of view of both production and economics. Such housing would provide advantages not only in terms of hygiene, animal health, nutrition and labor costs, but also in the costs of construction (Bardakcioglu et al., 2004; Uzal and Ugurlu, 2006; Kaygusuz and Tumer, 2009; Can et al., 2010).

Many studies have found that not enough use is made of mechanization for waste disposal in Turkish cattle farming, and that especially in enclosed housing where animals are kept standing and tethered and cleaning is carried out by means of a shovel and wheelbarrow, labor requirements are increased. It has also been found that in the various regions of Turkey, little consideration is taken of necessary conditions in the choice of location for animal housing. It has been established that on this kind of farm, mistakes are made in the choice of location for animal housing, buildings are not located in a convenient way in

the farm yard, and ancillary facilities, especially those for the storage of liquid and solid waste, have been neglected. It was found that in the choice of location, construction and operation of manure storage facilities, no account is taken of their capacity and distance from human habitation or of prevailing wind direction and rainfall as set out in national standards. Manure is generally stored directly on the ground and uncovered in farms which do not have a manure pit, causing problems such as seepage of the liquid in to the soil, disease, smell, and flies. It is stated that the animal housing on most of such farms is located within the farm yard and adjacent to human dwellings. The places where solid and liquid waste is stored are usually next to the

animal housing, and it was emphasized that these manure heaps are very close to neighboring farms and that they caused environmental problems. It was found that haphazard manure storage had adverse effects on human and animal health (Akdeniz, 1984; Ucak et al., 2000; Bakir, 2002; Bardakcioglu et al., 2004; Karaman, 2005; Atilgan et al., 2005a, 2005b and 2006; Yaslioglu and Arici, 2005; Onal and Ozder, 2008; Ozturk, 2009; Kaygusuz and Tumer, 2009; Can et al., 2010). For this reason, there is a need for modern manure management practices and structures for the disposal and storage of waste and for its exploitation as biomass.

Table 1. Structural Characteristics of Cattle Housing in Dairy Farms in the Various Regions of Turkey as Determined by Different Researches

| Research Area | Structural Characteristics of Cattle Barns | | | | Reference |
|---------------|--|--------------------|----------------|-----------------------------|---------------------------|
| | Construction Type | | Housing System | | |
| | Closed (%) | Open/Semi-open (%) | Tie Barn (%) | Loose/Free Stall system (%) | |
| Van | 100 | 0 | 100 | 0 | Bakir, 2002 |
| Aydin | 48.7 | 51.3 | 30.3 | 69.7 | Bardakcioglu et al., 2004 |
| Tokat | 100 | 0 | 100 | 0 | Karaman, 2005 |
| Bursa | 78.8 | 21.2 | 42 | 58 | Yaslioglu and Arici, 2005 |
| Tekirdag | 91 | 9 | 91 | 9 | Soyak et al., 2007 |
| İzmir | 11 | 89 | 8 | 92 | Ozturk, 2009 |
| Giresun | 100 | 0 | 100 | 0 | Tugay and Bakir, 2009 |
| Average | 76 | 24 | 67 | 33 | |

It was found that, in contrast to the insufficient mechanization in waste management, mechanization is employed in milking on the majority of farms. However, efficiency has not been achieved in milking due to structural problems in housing (Onal and Ozder, 2008; Bardakcioglu et al., 2004; Can et al., 2010).

In the past few years, various types of government support for animal rearing has enabled the establishment of large-capacity intensive animal-rearing operations, in particular those with 1000 or more cattle with up-to-date housing construction with air-conditioning and the intensive use of mechanization in milking and manure management. These kinds of farm contribute to the national economy in terms of animal production. However in the barns constructed beyond the control of agricultural engineers; some designing faults are observed such as inappropriate barn construction type and dimensioning of structural elements incorrectly.

Sheep and goat farming

Animals like sheep and goats are generally kept in covered or open pens to protect them from the weather and from attack by wild animals. Housing should take account of animal welfare as well as environmental considerations and production systems. In providing these conditions the economy of animal housing at farm level and the nature of the animals should not be ignored (Taskin et al., 2010).

The type of housing for sheep and goats will vary from one country to another and even from one region to another in accordance with factors such as the purpose of the animal rearing

and the season when the animals give birth. For example, if births take place under harsh climatic conditions more sheltered housing construction will be needed, but if it takes place in the grazing season, more elaborate construction will be required (Dawkins, 2004; Caroprese, 2008).

In research examining sheep and goat farming in the various regions of Turkey, it was found that pens used as animal housing were usually basic structures not conforming to planning criteria, or that on some farms sheep were kept on the ground floor of two-storey buildings or mixed in with cattle. It was found that pens were mostly of the covered type, that building construction in certain areas was similar, and that some pens were still constructed from mud brick. Most housing had serious constructional problems from the point of view of planning criteria. Also it was stated that sufficient account had not been taken of the necessary planning principles in the construction of the pens, and that none of the buildings constituting the animal housing followed the necessary principles relating to location and planning. It was pointed out that there were great shortcomings and errors in the design of pens and buildings used as animal housing, which made it impossible to provide animals with the right environmental conditions, thus adversely affecting productivity and thereby profitability (Unal and Yilmaz, 2009; Sisman et al., 2009; Kocaman and Gunal 2007; Paksoy et al., 2006). Determined structural features of pens in some regions of Turkey are summarized in Table 2. The majority of the pens (71%) in the research area are closed type. In such pens construction costs are increases and also difficulties have been encountered in ensuring a successful environmental control.

Sheep and goat farming in Turkey especially for small enterprises is generally carried out in an extensive or semi-intensive way. This type of farm generally has poorly-constructed pens or similar buildings as animal housing. In order to ensure efficiency and profitability in these farms, providing appropriate environmental conditions and modernization of the pen systems

has great importance. In recent years, through government support for animal rearing, large-capacity commercial enterprises established more modern pens. Mechanization and environmental control are better in these shelters. However some designing faults are encountered adversely affecting the construction cost and animal welfare.

Table 2. Structural Characteristics of Pens in the Various Regions of Turkey as Determined by Different Researches

| Research Area | Pen Type | | Reference |
|---------------|------------|----------|--------------------------|
| | Closed (%) | Open (%) | |
| Bolu | 67 | 33 | Sisman et al., (2009) |
| Tekirdağ | 55 | 45 | Kocaman and Günel (2007) |
| Kahramanmaraş | 91 | 9 | Paksoy et al., (2006) |
| Average | 71 | 29 | |

Conclusion

In Turkey, especially on farms which practice traditional family animal-rearing, animals are kept in housing which is constructed without proper regard to local and climatic conditions, in conditions which are detrimental to animal welfare and which cause conditions of stress. Shelter constructions are usually closed type and have a heavy construction which is unnecessary and has designing faults.

It is well-known that every extra investment spent on housing construction is repaid with an increase in productivity. For this reason, it is necessary to examine in detail before commencing construction factors such as the number of animals to be kept on the farm, the planning of animal productivity and production, physiological needs, the necessary amounts of equipment and its technical characteristics, and local geographic and climatic conditions in order to reap the expected economic benefits from the housing.

Therefore instead of the traditional structures in the construction of shelters, constructions designed to ensure a successful environmental control is needed.

On the other hand, it is to be noted that participation in various kinds of organizations such as cooperatives and associations is increasing and that with the help of these organizations the level of use of mechanization in such operations as waste cleaning, and recognition of the need for such housing provisions as separate birthing areas has also increased.

To overcome the designing faults, farmers should cooperate with agricultural engineers and universities in the beginning phase of the project. In this context, through cooperation between cooperative or organizations related to animal husbandry and universities, developing of suitable shelter designs for the region is needed. Application of these projects by the members of the organizations will provide significant contributions to sustainable livestock farming.

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