Professional paper
10.7251/AGSY1404965G

NUTRITIONAL CHALLENGES IN ORGANIC LIVESTOCK SYSTEMS OF THE TROPICS AND SUBTROPICS: CASE OF SHEEP PRODUCTION IN IRAN

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Abstract

Considering the rapid growth of the organic food market in North America and Europe, an increasing number of agricultural producers in developing countries and especially tropical and subtropical areas tend to convert their production system to organic agriculture (OA). Due to the existing similarities between OA and traditional farming systems in many developing countries, it is possible for most traditional farmers to convert to an organic system. However, converting to such a system for livestock producers has always been challenging from a nutritional point of view. In this review, nutritional challenges in organic sheep production in Iran are studied. For this purpose, the general situation of sheep production, common feed resources and current rearing systems in Iran were described. Accordingly, present nutritional challenges for each production system to be converted to organic were also discussed. The results of this study revealed that sheep production in the range-band system to a large extent, and in farm-flock and semi-extensive systems to a favorable extent, were in line with international organic standards regarding animal feeding. On the other hand, the feed-lot system was in contrast with organic definitions in general. However, the evidence seems to show that finding the adequate organic feed resources may be the major challenge for organic sheep producers in Iran.

Keywords: *Organic agriculture, animal nutrition, sheep production, developing countries*

Introduction

Recent years have seen a rapid growth in the organic food market (IFOAM, 2005; Jaffee & Howard, 2010; Schleenbecker & Hamm, 2013). North America and Europe makes the biggest contribution in the organic products market in terms of consumption according to the statistics published by Research Institute of Organic Agriculture (FiBL) and International Federation of Organic Agriculture Movements (IFOAM) in 2013. Znaïdi (2001) concludes that this trend has led to the creation of new opportunities for farmers in developing countries to export their organic agricultural products to North America and Europe and their interest in expanding organic agriculture (OA) is increasing. Among the mentioned countries, tropical and subtropical areas may be considered as remarkable considering their good potential for agriculture production. In a study of Ben Kheder (2001), Znaïdi (2001) found that because of the existing similarities between OA and traditional farming systems in many developing countries, it could be possible for many traditional farmers to convert to organic system.

Livestock production, as one of the elementary units of the food chain system (Lamine & Bellon, 2009), has always been a matter of debate among scholars. Animal feeding, in particular, is of great importance considering its key role in livestock production. In all international guidelines and standards for OA, such as in European regulations, detailed requirements regarding animal nutrition can be observed. Therefore, one of the challenging issues that should be noted by livestock producers who want to convert to OA is animal nutrition. This paper aims to point out a number of nutritional challenges in organic livestock systems faced by one of the tropical or subtropical countries and further to come up with some useful recommendations in order to overcome these challenges.

Taking the local climate into account, Iran can be seen as a good example of a tropical or subtropical country (Badripour, 2006). Hence, Iran has been chosen as the case study in this research. In addition, as sheep production is considered to be the most important red meat in Iran (Hassanpour, 2012), the study will focus on sheep production.

Materials and methods

In the present paper journal articles, books, official statistical books about Iran and data banks, such as Food and Agriculture Organization (FAO) and Word Bank, are studied.

Background of sheep production in Iran

According to statistics published by FAO (2013), in 2011, Iran, with a total of 49.0 million, had the fourth largest number of sheep worldwide. Mirzaei (2010) reports that there are 26 different breeds of sheep in Iran and most of them are used for several purposes. He claims that Iranian sheep are considered the sixth best sheep in the world in terms of meat and milk quality. Currently, there is no official report which bodes on any certified organic sheep production in Iran.

Feeding methods

Sheep and goats in Iran are commonly kept in mixed small ruminant herds (Mirzaei, 2010). However, the main enterprise considered as sheep production (Koocheki & Mohalati, 1994). Valizadeh (2012) categorizes sheep production in Iran from the nutritional point of view in four different methods: range-band, semi-extensive, farms-flock and feedlot.

- *The range-band method*: Ruthenberg (1980) calls this system, total nomadism grazing system. In this system livestock keepers do not have a permanent living place and move with their families and animals from a very cold or very hot area to a temperate one with appropriate pastures, depending on the seasons (Ruthenberg, 1980). The flock has permanent access to open air and there is no specific fold yard for keeping animals (Saadat-noori & Sepah-mansoor, 2011). In unfavorable climate conditions, mating season or late gestation time, the herd will be fed by hand with fodder and concentrate (Valizadeh, 2012).

- *The semi-extensive method*: This system complies with a semi-nomadism grazing system defined by Ruthenberg (1980). According to him and also Valizadeh (2012), the farmers have a permanent living place and in cold seasons they keep their animals in an enclosed shed. In the time of sedentary, stock keepers are also engaged with cultivation (Ruthenberg, 1980). In other times they move with their animals in order to find appropriate pastures (Valizadeh, 2012).

- *The farms-flock method*: This method is very similar to Ruthenberg's (1980) definition of a fallow system. According to this definition, animals are allowed to graze on fallow lands, stubble of croplands and available pastures around the village and they would be fed by hand with fodder in case of necessity. Khaldari (2011) also names this method an intensive or village-flock system. He refers this to the system used by a cultivator who has access to the pasture and keeps sheep along with cultivation. The work of Saadat-noori and Sepah-mansoor (2011) indicates that this method is customary in most of rural areas of Iran.

- *The feedlot method*: Also called the intensive method or sheep fattening, this is a kind of high input system (Khaldari, 2011). The main purpose of this method is meat production (Valizadeh, 2012). In this feed-intensive and labour-extensive system, feed comes from outside of the farm and from the view point of the nutrient flow, the system is very open

(Seré et al., 1995). In this method, specialized animals with high yield are kept in sheepcotes and are fed intensively by feed including a high percentage of concentrate (normally 50-60% of dry matter) (Saadat-noori & Sepah-mansoor, 2011).

Feed resources of Iran

In the list of certified organic crop products of Iran, which was published by FiBL and IFOAM in 2013, no plant which may be considered as animal feed for commercial purposes can be observed. Jalali-zonnoor (2012) mentions fresh or dry fodder of pastures, dry legume fodder, cereals and grains and their straw, bran and stubble, corn forage and silage, and concentrate feed as the most common sheep feedstuffs.

Goli-eskardi (2007), Saadat-noori and Sepah-mansoor (2011) and Jalali-zonnoor (2012) separately state that in Iran pasture-based sheep meat production is the most practical and economic system and the cheapest and most appropriate resource for sheep feed is pasture. Forest, Range and Watershed Management Organization (FRWMO) (2013) classifies pastures of Iran with regard to their condition of vegetation holding. These classifications and their size and share of total existing rangelands of Iran are given in table 1.

Table 1: Pasture classification of Iran

Condition	Area (ha)	Percentage
Good	7,181,250	8.5
Poor- Fair	21,419,151	25.3
Poor	56,214,590	66.2
Total	84,814,991	100

Source: FRWMO, 2013

Jalali-Zonnoor (2012) states that in dry regions in Iran, flocks are fed by poor pastures, stubble of grain and cereal croplands, vegetation on fallow lands and wildlings. He also says during seasons with lack of pastures, sheep would be ad libitum fed by a diet including dry forage, alfalfa and silage. Generally, plant materials which are not used for feeding cows and poultry would be used for sheep feeding (Jalali-Zonnoor, 2012). Sheep diets normally include 50% of forage and 50% of concentrate, although formulating a ration including 40% of forage and 60% of concentrate is also prevalent in the country (Saadat-noori & Sepah-mansoor, 2011). Since using agro-industrial by-products may be more economic than the utilization of the other feedstuffs, farmers try to formulate a cheap and diverse ration for their sheep by application of available by-products in their diet (Mirzaei-aghsaghali & Maheri, 2008).

Discussion and conclusion

Considering the multipurpose and locally adapted sheep breeds existing in Iran, it seems that there is a good potential for organic sheep production. Similarity between some of the current feeding methods in this country and organic principles amplifies this claim. Taking into consideration the emphasis of OA in terms of the maximization of using pasture for herbivore nutrition (EU council, 2008), it can be concluded that the rang-band system might be in line with organic standards in terms of the feeding method. However, it might be possible that the producers who implement the semi-extensive or farms-flock methods in order to rear their animals, could adjust their production to OA by obeying some rules such as the necessity of using at least 50% of the feed produced at the farm unit itself or another regional organic farm (EU council, 2007) or a diet consisting of a maximum 40% of concentrate feed (in some exceptional cases up to 50% for a limited time period) (EU council, 2008). As Nardone et al.

(2014) comment, the conversion process of conventional small ruminant production to organic seems to be less complex in terms of management procedures than in other animal species. Meanwhile, due to the necessity of the establishment of a close cycle between animal production and management of agricultural land in the organic system and prohibition of landless livestock production (EU council, 2007), it could be concluded that compatibility of the feedlot method with OA appears to be unrealistic with respect to the nutrition.

Nevertheless, as regards the fact that in organic production system animals have to be fed by organically grown feedstuffs (IFOAM, 2005), Iranian livestock producers are definitely not able to certify their products as organic as long as they do not have access to certified organic feed, even when they comply to all organic standards in their feeding management. However, even though the largest share of pastures in Iran are natural, (Valizadeh, 2012) which means they are not interfered by artificial cultivation, fertilization and irrigation (Jalali-Zonnoor, 2012), since none of them are certified as organic, products obtained from animals grazed on them cannot be sold under the organic label. Above and beyond, the evidence seems to indicate that the country of Iran has a shortage of pasture feed resources. The work of Khaldari (2011) reveals that the annual required total digestible nutrients (TDN) needed to fulfill the annual feed demand in Iran is 31,740,713 tons. As revealed by the statistics from FRWMO (2013), the pastures of Iran produce 5,885,000 tons. This amount is sufficient to feed 37 million animal units during the 7 months grazing period in each year, currently 83 million animal units graze on them. The remaining required TDN should be supplied by non-pasture and non-jungle resources. According to Khaldari (2011), 22,756,400 tons of TDN are annually gained from arable lands, food industry by-products and food wastes in Iran. Nevertheless, among the mentioned resources, no significant amount of organic feedstuff can be used for animal nutrition purposes. Accordingly, it might therefore be recognized that the securement of adequate feedstuff is the most challenging issue not only for livestock producers interested in OA but also for those that are not.

However, particularly for those producers who are willing to convert to organic system finding certified organic feed and also certifying their own products can be considered as major problems. General observations of the current status of OA sector in Iran reveals that one of the primary barriers for developing organic food production is lack of certification systems. The work of Kledal et al. (2012) reveals that two responsible governmental organizations for organic legislation are Organic Committee of the Agricultural Ministry and the Iranian Standard and Industrial Research Institute. However, holistic organic policies or supports for farmers who want to convert to organic system does not exist yet (Kledal et al., 2012). In the country, there are no national certification bodies and only some international certifying companies are active (Kledal et al., 2012). The work of Znaïdi (2001) indicates that agricultural systems and conditions such as flock management or climate conditions are widely different between Europe and developing country. Similarly in Iran, because of lack of local certification bodies, certification procedure would be complicated and costly, especially for smallholder farmers (Mahmoudi et al, 2014).

Therefore, it could be concluded that in a country which is similar to Iran, according to what this study finds, the development and enhancement of a locally adapted certification system on one hand and the protection and expansion of both natural and agricultural feed resources on the other facilitate the conversion procedure for sheep producers from a nutritional point of view.

Acknowledgments

I would like to express my deep appreciation to Prof. Uta Dicköfer and Dr. Sabine Zikeli, my research supervisors, for their patient guidance and useful critique. In addition, I would like to thank Dr. Hossein Mahmoudi for his valuable and constructive suggestions during the

planning and development of this paper. My special thanks to Miss. Samira Sahami for her generous support and assistance during all steps of this study and my great appreciation to Miss. Katharine Cresswell Riol who helped me in revising and proofreading the content of the paper. Finally, I wish to thank my family for their support and encouragement throughout my study.

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