

Organization of livestock production in the Khorezm region of Uzbekistan

Organizacja produkcji zwierzęcej w regionie Khorezem w Uzbekistanie

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Abstract. Livestock farms and households are the main actors in livestock production systems of Uzbekistan, Central Asia. This paper describes and analyses livestock production in the irrigated land use systems in Central Asia base on the case of the Khorezm region, in Northwest Uzbekistan. In this region, livestock producers presently face water shortage, pasture and fodder scarcity whilst the livestock number continuously increasing. A total of 56 livestock farms and 80 households were surveyed with structured and semi-structured questionnaires. The findings show that livestock sector of Khorezm region is in the transition period. The management system needs to be developed in order to increase the efficiency and productivity of husbandry primary production system, reduce water use, and accordingly to link it to the requirements of food chain and growing market needs.

Key words: *organization of livestock production, Uzbekistan, Khorezm region*

Słowa kluczowe, organizacja produkcji zwierzęcej, Uzbekistan, region Khorezem

Introduction

It recurrently has been illustrated worldwide that livestock significantly contribute not only to economic viability and nutrient cycling in mixed systems [Gutteridge and Shelton, 1994; Schiere and van Keulen, 1999] but also to livelihood security. Yet, the integration between crops and livestock depends on options for maintaining a sufficient level of forage production. This is particular true in the case of the irrigated regions of the five countries in Central Asia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan where the total 11 million ha of irrigated land is predominantly used for irrigated crop production such as of cotton and winter wheat. Yet, recent researches [Iniguez et al 2005; Müller 2006; Djanebekow 2008] underline the growing importance of livestock for livelihood security.

In the aftermath of independence, the various reforms to support the transition process towards market-oriented economy in Central Asia countries have been undertaken, including market liberalization, reformation of land relations, structural changes, and creation of supporting market infrastructure [Djanibekov 2008]. Consequently, also the ownership structure of the livestock sector was restructured and as a result the role and functioning of livestock production systems after independence of Uzbekistan in 1991 has been drastically changed. In that process, the former state cattle breeding farms were replaced by newly established private livestock farms (LF) or were privatized and became the assets of households (HH). To further support the new established system of livestock producers, Uzbek government has issued several decrees aiming at increasing the number of livestock in LF and HH, and developing production of livestock commodities. The focus of the national administration perhaps explains that, in contrast to other former Soviet Union countries, the transition period in Uzbekistan was not accompanied by a drastic decrease in the number of livestock and outputs from livestock [Iniguez et al. 2004]. For example, in the Khorezm region of Uzbekistan the number of livestock has even been increasing (Table 1).

However, the current situation is not conducive for a further development of the number of livestock given the deficits of pasture, water and fodder for livestock production. Besides, no enough reliable, accurate and consistent data available disclosing the different livestock species, feeding regimes and practices in Khorezm, the available data underlined a comparably low productivity of the livestock sector [Martius et al. 2006]. Given the low productivity of livestock in Uzbekistan, even small improvements might cause remarkable effects [Müller 2006]. Besides, an improvement in livestock productivity shows the potential to decrease water consumption in the agricultural sector of the region [Djanibekov 2008]. Thus, a more detailed study of livestock sector would help to derive applicable recommendations for livestock producers specifically, and the region as a whole. This demands first a systemic analysis of the present role of livestock husbandry and of economic and ecological impacts of livestock management at farm and regional level which is imperative for livestock owners and government and self-government institutions alike [Maciejczak, 2009]. Such an analysis requires up-to data on livestock performance and husbandry practices relating to the different mixed farm types to understand farmers' demands and the limiting factors.

The objective of this study therefore was describing most important factors of the current organization of livestock production and analyzing further development opportunities on the case of the Khorezm region, Uzbekistan.

Methodological approach

The study was conducted in the Khorezm region located at (41°32'12"N, 60°40'44"E) north-western part of Uzbekistan 100m above sea level. The climate in this 6,400 km² region is continental with an annual precipitation of not more than 100 mm which is far less than the annual transpiration of 1500 mm. The territory makes 6.1 thousand km² and occupies 1.4% of the republic territory. Khorezm region itself is divided into 10 administrative – territorial units, districts, which are in their turn divided into 101 citizens' assemblies and 612 settlements. Major rural

administrative bodies are district *khokimiyats*¹, district branches of Regional Agriculture and Water administration, and village citizens' assemblies.

Ownership structure of livestock producers in Khorezm region has three types: HH, LF and other agricultural enterprises. As more than 90 percent of the livestock of Khorezm region belongs to HH and more than 7 percent belongs to LF, only those two types of livestock producers were investigated. Thus, other agricultural enterprises which constitute only around 1 percent of regional livestock were omitted from the analysis [KRSD, 2007].

In order to comprise wider area and taking account of financial situations, Stratified Random Sampling method was used [Ardilly et al. 2006]. Therefore, stratum were selected based on some factors and then from those stratum the samples were selected by simple random sampling method. Therefore, 10 relevant factors as cattle heads per 100 hectares, sheep and goat heads per 100 hectares, share of forage area, grain crops area and cotton area, population per HH and geo-location of districts in water usage were analyzed. While analyzing, each factor was ranked independently as high, low or middle. In this ranking, 2 or 3 districts with highest numbers different from others were ranked as high, 2 or 3 districts with lowest numbers different from others were ranked as low and districts close to average number were ranked as middle. Urgench district had the largest number of high scores and smallest number of low scores. The opposite was observed for Gurlen district. Therefore, those two districts and districts with average amount of high, low and middle scores, i.e. Khozorasp, Kushkupir and Yangiariq districts were selected for the survey.

Next, from those districts, LF and HH were randomly selected. The number of LF for the survey was based on the total number of LF in district. Therefore, 14 LF from Urgench, 12 LF from Gurlen and 10 LF from each of other three districts were selected totaling to sample of 56 LF. In order to select sample HH, random sampling was used two times: first, to select 2 villages from 5 stratum and second, to select 10 HH from each of selected villages totaling to 100 HH initially, but decreased to 80 HH later as they are very similar to each other regardless of district changes. The data regarding activities of HH and LF of Khorezm region were obtained via direct interviews based on unified questionnaire. The number of questions at both of the questionnaires for LFs and HHs were 65 where many of them included tables and sub-questions so would be able to get as much and accurate information as possible.

Livestock types

Main livestock types in LF and HH of Khorezm region are cattle, sheep, horses, donkeys and different types of poultry. Regarding goats and pigs livestock producers in Khorezm region do not seem to be eager to keep them that only some LF, but none of HH keep them. Cattle is the main livestock type in both of LF and HH. In keeping cattle there is an interesting similarity between an average LF and a group of average 11 HH (HH group). Because, there are in average 44 cattle per LF and 43 cattle per HH group (Table 1). Besides, there is also similarity in cattle groups when they are grouped according to ages and sexes. For instance, the number of cattle in fattening process (16 percent) and number of yearlings (16 percent) have same amounts in both an average LF and HH group. However, HH seem to concentrate more on milk production than LF. Because, the number of cows and calves is 26 (61 percent) in HH group and it is 22 (50 percent) in an average LF. Thus, the number of bulls aged between 1 and 2 years old is more than two times of that of HH group.

Table 1. Number and percentage of cattle groups according to ages and sexes of animals.

Cattle groups	Number in an average LF.	Number in average HH group
Calves less than 1 year	8	11
Bulls, ages between 1 and 2	7	3
Yearlings, ages between 1 and 2	7	7
Cows elder than 2 years	14	15
Cattle for fattening, elder than 2 years	7	7
Special bulls for mating	1	0

Source: Authors' calculations based on survey results.

Milking cows at LF have higher yield than that of milking cows in HH. Average annual yield of milking cows at LF is 6.2 liters per cow per day and it is 4.7 liters per cow per day at HH. Besides, yield of cows at LF and HH differs according to winter and summer periods. Cows at LF and HH give 5.5 and 4.2 liters per cow per day respectively in winter period and it increases up to 6.9 and 5.2 liters per cow per day respectively in summer period. The minimum and maximum yield of local cows at local conditions differ from 3 liter up to 20 liters per cow per day, showing the possibility of increasing the yield of local cows up to 10.9 liters by increasing feeding practices. Farmers and HH owners are literate enough that when it is asked about lactation period almost all of them said 305 days or 10 months. However, when the question was asked in a different way the lactation period of cows are calculated as 231 days at LF and 290 days at HH. Thus, the annual yield of cows at LF and HH are also calculated as 1434 and 1363 liters respectively. However, it should be noted that in Khorezm region both of LF and HH first feed the calves with mother cows' milk and then milk the cows. Thus, the mentioned yield of milk is the part which is obtained from cows for

¹ Khokimiyat – main general state administration body

people's consumption and excludes the amount of milk calves drunk. If a calf drinks average of 3 liters per day, the milk yield of cows at LF will be 2127 liters and at HH it will be 2233 liters. As average liter of milk is equal to 1.03 kg in weight [Sherbon 1988], the annual milk yield of cows at LF will be 2191 kg and at HH it will be 2300 kg, which is same as the statistical report which is 2290 kg average for Khorezm region [KRSD 2009].

Sheep is usually being kept by LF and HH mainly with an intention of ready meat for some expected events as holidays, birthday parties and charities (especially during Islamic Ramadan and Qurban holidays) or for some unexpected cases to use as financial insurance. Besides, slaughtering a sheep for some special guests is also a tradition in Khorezm region. Thus, the number of sheep at LF and HH usually fluctuates. HH usually do not, but LF rarely keep goats in mixed conditions with sheep. Livestock producers usually do not milk goats, but cases of milking goats for ill people who have stomachache, lung ache, or have digestive difficulty are some exceptions. Thus one can conclude that, goats are not being milked for profit purposes, regardless of demand where there is possible demand at local markets. LF and HH are keeping horses and some donkeys with an intention of mainly for smaller sized and lighter luggage transportation. The percentage of horse-courts and donkey-courts is 30 percent and 14 percent at LF and 1 percent and 44 percent at HH respectively. Usually this type of transport is used locally within villages as to use to and from farms. Regarding pig production, it is interesting that neither LF nor HH are eager to produce pigs. However, the price of pork at the local markets is higher (7000 sums/kg) than that of cattle meat (6000 sums/kg)². Although, this can be justified by religious believes of the local people, from market economy point of view, it is possible to develop pig production in Khorezm region. Major poultry types at LF and HH of Khorezm region are chicken, goose, duck, turkey and indushka³. According to LF and HH owners male and female ratio at poultry is usually 1:10. Poultry is important for LF and HH first for eggs and second for meat as they are ready whenever they need. The egg laying ability of egg layer hens differs depending on summer and winter periods both at LF and HH. However, average egg laying efficiencies of egg layer hens is higher at HH than that at LF. For instance, 100 hens at LF and HH give average of 65 and 72 eggs respectively in summer period and give average of 23 and 25 eggs respectively in winter period.

Livestock products

In 2008, total amount of produced cow milk was 567100 tons [KRA 2010]. In order to know the local demand, the number of local people in Khorezm region (1518 thousand of inhabitants) [KRA 2010], should be multiplied by the annual minimal milk amount per person according to the norms of the Ministry of Health of the Republic of Uzbekistan, which is 477,89 kg/person/year [MHRU 2000]. So, the total local minimal demand for the milk and milk products in Khorezm region was 725437 tons, which shows 158337 tons of milk shortage at the local markets of Khorezm in 2008. In other words, there is a high demand for milk and milk products at the local markets which shows the further development opportunities for local milk producers and processors.

Regardless of good market opportunity, milk production at LF and HH is not well developed. Only 63 percent of produced milk at LF is being sold out to processing enterprises or public consumption and 37 percent of milk is being kept at the farm for family and employee consumption or for further processing within LF. Only in some very few cases LF process milk to produce products as cream, yogurt, butter, cottage cheese, bryndza and other traditional dairy products. The situation is even worse at HH that, only 14 percent of produced milk is being sold to other costumers and 86 percent of milk is being used for own consumption or for further processing. However, processing of milk in HH is being done for own consumption purposes only. The main types of those homemade products are cream, yogurt, butter, etc. On other hand milk processing sector of Khorezm region is underdeveloped. There are only 4 registered processing factories that process only 638 tons of milk annually [KRSD 2009], which is only 0.1 percent of total milk amount produced for the market. Thus, the development is needed also for milk processing sector of Khorezm region.

According to the annual minimal meat norms of the Ministry of Health of the Republic of Uzbekistan (38.56 kg/person/year) [MHRU 2000], total local minimal demand for meat products in Khorezm region is 58.5 thousand tons annually. In Khorezm region, there was 84 thousand tons (in live weight) of meat available in 2008 [KRA 2010]. According to local butchers, the average slaughtered weight of average cattle makes around 65 percent of live weight⁴. Thus, total amount of available meat in Khorezm region in slaughtered weight was 54.6 thousand tons, which was 3.9 thousand tons less than local demand.

Based on the same source of Ministry of Health of the Republic of Uzbekistan [MHRU 2000], 12.5 percent of required meat products, or 7.29 thousand tons of meat in 2008, should be processed. However, meat processing sector of Khorezm region is also not yet well developed. There are 8 registered meat processing factories that process only 30 tons of milk annually [KRSD 2009], which is only 0.4 percent of total amount of annual produced meat. Thus, meat processing sector of Khorezm region also should be developed.

A part of above described main products of husbandry system there are also wool, eggs as well as manure produced. However in this paper the analysis of them will not be considered.

Production regime

² Author's survey of Urgench city central market on April 2009

³ Indushka is a type of turkey slightly similar to duck.

⁴ Based on authors' survey of local butchers of Khorezm region in 2008

Average total farm size of LF in Khorezm region is 28.1 hectares where HH group has 2.75 hectares (10 times less). Similarly, sown area of an average LF is 22.1 hectares where it is 2.18 hectares (10 times less) for HH group. That should be the reason that LF have different crop growing practices than that of HH. Majority of HH are growing second crops in their land area in the same vegetation period, where second crops seem not very important for LF. Thus total percentage of land area usage shows 159.6 at HH and 101.1 at LF. For instance, 67 percent of land area is allocated to wheat, 44 percent is allocated to sorghum and 41 percent is allocated to rice at HH (Table 2). However, cotton (32 percent) and maize (18 percent) seem to be more important for LF than wheat (16 percent). Similarly, alfalfa (13 percent) seems to be more important for LF than rice (7 percent) and sorghum (7 percent). From widespread usage point of view wheat overcomes cotton. Although more LF (82 percent) are growing wheat than those who grow cotton (70 percent), allocated land area for wheat (18 percent) makes half of that of cotton (32 percent).

Table 2. Main types of grown crops at LF and HH areas in 2008

Crop type	Share of grown crops [%]		Share of widespread usage of crops [%]	
	LF	HH	LF	HH
Cotton	32	0	70	0
Maize	18	3	82	11
Wheat	16	67	57	79
Alfalfa	13	2	66	5
Rice	7	41	45	54
Sorghum	7	44	43	68
Vegetables and melons	1,1	1,3	23	2
Triticale, sudan and barley	1	0,3	11	1
Other crops	6	1	*	3

Source: Authors' calculations based on survey results.

* LF grow different types of crops and impossible to fill this part.

Grazing cattle in normal pastures is just an imagination for the majority of LF and HH owners. Although some of LF have small part of deserts, there are no enough green grasses to be able to graze cattle. However, LF and HH still try to find any opportunity to graze their cattle at small part of deserts, stubbles, beside canals, collectors and lakes, or not cropped areas. Depending on availabilities of time and area, 36 to 54 percent of LF and 4 to 29 percent of HH try to graze their cattle at any of those possibilities. The case is similar for grazing sheep and goats for both of LF and HH.

Cattle and sheep at LF and HH are being fed by different fodder types. In feeding cattle with grain products LF have more varieties of grains than that of HH. Only 35 percent of HH use crushed rice and 8 percent use crushed maize, where these percentages are 47 and 44 respectively at LF. Where HH are not using any crushed sorghum and wheat grains, it is being used by 20 and 4 percent of LF respectively. More than 80 percent of LF uses cotton seed cake, cotton seed husk and wheat residuals. Although cotton seed cake, wheat and rice residuals are important also for HH, they do not pay more attention to cotton seed husk (44 percent) as LF do. Besides, ready mixed concentrate seems to be not developed in Khorezm region that only around 5 percent of HH and LF use it. Also waste food products seem to be another important fodder type for HH.

Forages as maize, sorghum and alfalfa stems are being used in feeding cattle, either by directly giving stems while green or by giving them after drying. In both of LF (80 percent) and HH (84 percent) sorghum stem is the most widely used forage. As many HH do not grow maize and alfalfa only 27 and 14 percent of HH respectively can use their stems. However, maize and alfalfa stems are being used by 75 and 69 percent of LF respectively. As silage making is a big problem for major LF and HH, only 30 percent of LF and 3 percent of HH can feed cattle with silage. In addition to wheat and rice straws there are other weeds as licorice, camel thorn and cane which can be fed to cattle at LF and HH. But, wheat and rice straws are still being as the most widespread type of fodder that, feeding cattle. Regarding feeding sheep with grain products sorghum grain with grain heads is the main type of fodder that 54 percent of LF and 16 percent of HH use it. Second main type of grain for sheep is crushed rice that 19 percent of LF and 11 percent of HH use it. In total 58 percent of LF use different kinds of grains as sorghum grain with grain heads, crushed rice, crushed wheat, crushed maize and crushed barley. In this case HH find difficulty to find enough grains that they can feed their sheep with grains as sorghum grains with heads, crushed rice and crushed maize only. Among agricultural by products cotton seed husk, wheat residues and cotton seed cake are the main fodders for sheep both in LF and HH. Among dry forages LF use more variety of forage types than HH that majority of LF feed their sheep with sorghum stem (50 percent), alfalfa stem (50 percent) and maize stem (46 percent). HH however, use mainly sorghum stem to feed their sheep (79 percent), but alfalfa stem (11 percent) and maize stem (21 percent) are just alternatives.

Feeding regimes at LF and HH change according to different seasons of the year. Feeding times and frequencies in summer and winter periods have big difference from each other. In order to analyze feeding regimes clearly feeding types of animals are divided into three main types as feeding with forage, feeding with mixed concentrates and watering. Majority of LF and HH usually feed their cattle with forage 3 and 4 times in a day. However, in general feeding frequency of cattle with forage shortens in summer period than that of in winter period. For instance, percentage

of LF feeding cattle with forage once in a day was 4 percent in summer and increased to 15 percent in winter. Similarly, percentage of livestock farmers feeding cattle 5 times a day was 20 percent in summer and decreased to 9 percent in winter period. Although feeding frequency is a bit different at HH, still it is possible to see the similar case. For instance, nobody from HH feed cattle once a day but 5 percent of them feed twice a day in summer period and this percentage increases to 5 and 22 percent in winter period respectively. In feeding sheep with forage, the majority of LF feed sheep 2 and 3 times in a day and majority of HH feed sheep 3 and 4 times in a day. Similar to cattle feeding, feeding frequency of sheep increases in summer and decreases in winter period.

Both of LF (98 percent) and HH (99 percent) concentrate on feeding cattle with mixed concentrate mainly in winter period. However, in summer period HH (57 percent) do not care much about feeding their cattle with mixed concentrate as LF do (76 percent). However, in general feeding frequencies of cattle with mixed concentrate is 2 times in a day at LF and HH both in summer and winter periods. In feeding sheep with mixed concentrate LF do not care as much of their sheep as HH do. Because, only 8 percent of LF feed sheep in summer and it increases to 62 percent in winter where 54 percent of HH feed sheep in summer and it increases to 100 percent in winter. Feeding frequencies of poultry in summer and winter seasons have almost no differences. Around 85 percent of livestock farmers and around 88 percent of HH feed poultry with grains mainly 2 and 3 times in a day both in winter and summer seasons.

Watering livestock is one of the major parts of feeding issues. Majority of LF and HH water cattle and sheep twice a day in summer and decrease it to once a day in winter period. Although majority of LF water poultry 3 times and HH 2 times in a day in summer period, both of them decrease it to once a day in winter period. In order to water cattle in summer period 36 percent of LF use water from canals and this decreases to 4 percent in winter period. Similarly, 4 percent of LF use water from collectors (including lakes) and it decreases to 2 percent in winter period. Thus using water from underground sources increases from 60 percent of LF in summer period to 94 percent of LF in winter period. These underground sources include using water through hand pump, electric pump, well, and water towers. Although 39 percent of HH use water from canals and 1 percent of HH use water from collectors (including lakes) in summer period, none of them can use neither canal nor collector water in winter period. Underground water usage increases from 57 percent of HH in summer to 98 percent of HH in winter. Besides, 3 percent of HH use drinking water of water pipes in summer and it decreases to 1 percent in winter.

Watering sheep is also similar to watering cattle both of LF and HH. 35 percent of LF use canal waters and 8 percent of LF use collector waters (including lakes) to feed sheep in summer and it decreases to 15 percent in using canal waters and 4 percent in using collector waters in winter period. Thus, underground water usage by LF increases from 58 percent in summer to 81 percent in winter period. In order to water sheep 46 percent of HH use canal water in summer period and it decreases to 6 percent in winter period. However, there are no any HH who uses water from collectors. Thus, in summer period 54 percent of HH and in winter period 94 percent of HH use underground water to water their sheep. In watering poultry, both of LF and HH prefer to use underground water and none of them use water from collectors.

Veterinary services are important for LF and HH in general vaccination and in cases as serious diseases. Otherwise 91 percent of livestock farmers and 70 percent of HH owners believe their own experiences in major health care issues. Artificial insemination is not widespread that 17 percent of LF and 6 percent of HH use this service. Cleaning sheds is an important issue for both of LF and HH regardless of cleaning differences in winter and summer periods. Cleaning sheds in daily basis is being performed by 71 percent of LF and 82 percent of HH in winter period and 46 percent of LF and 57 percent of HH in summer period. Disinfection is being performed by 91 percent of LF and 75 percent of HH. Serious sickness cases among cattle of LF appear during cold weather. But for cows of LF, giving birth process is the most serious case. However, in general serious sickness cases make only 1 percent of total cattle at LF. Unlike LF, serious sickness cases of cattle at HH appear from biting of louse and from liver disease, and this makes 8 percent of total cattle. In major cases, sick cattle are being cured by the help of local vets. The death case makes 1.8 percent of total cattle at LF and 2.6 percent of total cattle at HH. The main reason for cattle death at LF is the cold whether in general and for cows it is the birth giving process. Unlike the case at LF, death cases happen at HH mainly because of lice's biting and poisoning cattle's blood. However, health care issues can be considered as in better order at both LF and HH. Regarding improvement of cattle genetics, artificial insemination is being used for cows by local veterinary officials. However, majority of LF and HH are not eager to use this for their cows that only 17 percent of LF and 6 percent of HH are using from this service. However, health caring of cattle at both LF and HH is very good. Serious sickness case among cattle is only 1 percent at LF and 8 percent at HH. Similarly, death case among cattle is 1.8 percent at LF and 2.6 percent at HH.

Conclusions

The study showed that the livestock sector of Khorezm region, Uzbekistan is in a transition phase in order to improve the productivity and efficiency and to adjust to growing market requirements. The husbandry structure as well as production regime need to be improved through better management practices which will result with higher livelihood security of the region.

However, it needs to be noted that the scope of this paper does not cover all factors that should contribute to the development. The detailed analysis not only of primary husbandry production needs to be detail conducted. Also primary plant production should be taken into account. Among analyzed factors the influence of food and feed supply chains as well as water supply needs to be considered. Along with environmental and social systems analysis, including

institutional structure, they all will give a state of the art picture of food production in Khorezem region, as its sustainable development is needed.

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Streszczenie

W artykule przedstawiono wyniki badań empirycznych nad organizacją produkcji zwierzęcej w regionie Khorezem w Uzbekistanie. Za pomocą kwestionariusza ankiety przebadano w 2008r. 80 gospodarstw rolniczych i 56 przedsiębiorstw rolniczych prowadzących produkcję zwierzęcą. Stwierdzono, iż produkcja ta jest mało efektywna pod względem wskaźników produktywności oraz w małym stopniu pod względem struktury i wielkości odpowiada zapotrzebowaniu zgłaszanemu przez rynek. Dużą rolę w rozwoju produkcji zwierzęcej w regionie Khorezem będzie odgrywało zaopatrzenie w wodę oraz powiązanie produkcji z kolejnymi elementami łańcucha żywnościowego.

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