

Agricultural Development in Central Asia: A Survey of Uzbekistan, 2007–2008

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Abstract: A noted international economist specializing in agricultural development in the countries of the former Soviet Union and Eastern Europe presents the results of a survey of 797 dekhan (relatively small) and 803 peasant (larger) farms in Uzbekistan from August 2007 to May 2008. After analyzing the legislative framework for the country's agrarian reform, the author focuses on its impact on land holdings and the livestock economy (particularly dairying). Also discussed are herd sizes, milk yields, cattle breeding, feed crops, as well as household incomes and standards of living of rural inhabitants. The relevance of the survey to the state of the agricultural economies of Central Asian and other CIS countries is noted in the concluding section. *Journal of Economic Literature*, Classification Numbers: D13, O13, P32, Q15. 10 figures, 8 tables, 24 references. Key words: Uzbekistan, Central Asia, agriculture, agricultural land, agricultural reform, livestock, dairying, milk yields, cattle feed, crops, rural income.

Since the dissolution of the Soviet Union, agricultural development in all CIS countries, including the ones in Central Asia, has been driven by a process of land reform, which involves redistribution of land among producers and concomitant changes in farm structure. The underlying objective of land reform in all transition countries is to stimulate agricultural growth while improving productivity and increasing the incomes of their large rural populations, which rely on agriculture for a substantial part of their family budgets (see Lerman et al., 2004). In this paper, we review the process of land reform in Uzbekistan, a typical Central Asian country that gained independence in 1991, and examine its impacts on agricultural growth and rural family incomes. The impact of land reform on agricultural growth is examined on the basis of official statistical data. The effect of land reform on rural incomes and on some micro-level determinants of improvements in productivity is analyzed using unique information collected in our recently designed farm-level survey.

The farm survey utilized in micro-level analysis was conducted in August 2007 in 8 of the country's 13 main administrative regions (from East to West: Ferghana, Namangan, Tashkent, Syrdarya, Djizak, Kashkadarya, Khorezm, and Karakalpakstan).² The regions were selected on the basis of their agricultural profile to ensure a sufficiently representative coverage of the entire country. A total of 20 districts were then in turn selected from these 8 regions, again with due regard to representation of the local conditions. The survey sample included a total of 1,600 respondents divided into two groups:

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² The farm survey was carried out on behalf of UNDP by the Tahlil Sociological Research Organization in Tashkent.

797 dekhkan farmers and 803 peasant farmers.³ The respondents were chosen at random in each district based on local lists. We present in this paper the main conclusions and policy lessons derived from the farm survey about the impact of land distribution on rural incomes and possible productivity improvements in the livestock sector.

THE KEY ROLE OF AGRICULTURE IN UZBEKISTAN

Despite its mineral riches, Uzbekistan is a highly agrarian country, with its rural population at more than 60 percent and agriculture accounting for around 30 percent of both employment and GDP (CIS, 2006). As is typical of economies dependent on agriculture, Uzbekistan has a low income per capita: \$2,250 compared with nearly \$12,000 for Russia (PPP equivalents) (WDI, 2006). The low income and the high agrarian profile justify and drive the efforts for agricultural reform in the hope of improving the population's standard of living.

In terms of developments over time, the share of agriculture in GDP has fluctuated between 20 and 30 percent since 1995, showing a definite downward trend during the last few years. The share of rural population, on the other hand, is steadily increasing over time due to higher population growth rates in rural areas (from a constant 60 percent up to 1990 to 64 in 2004–2006). The share of agricultural employment remained steady at 40 percent up to 1990, but after a slight increase (to 45 percent) in the first years of transition (1991–1993) the trend changed to a downward slide. The share of agriculture in total employment had dropped to 28 percent by 2006 (Uzbekistan, 2005; Uzbekistan in Numbers, 2007). Usually, rural population and agricultural employment rise hand in hand. Thus in neighboring Tajikistan the share of employed in agriculture rose from 59 percent in 1995 to 67 percent in 2005, tracking the growth in rural population (CIS, 2006). The opposing trends in Uzbekistan since 1993 are surprising.

Agriculture in Uzbekistan is critically dependent on water, which is delivered by glacier-fed rivers and mountain streams rising in Tajikistan and Kyrgyzstan (Lerman et al., 1996). Crop production and most of livestock production (with the exception of the karakul sheep grazing in the desert) is mainly confined to irrigated areas. All cotton is grown under irrigation, and grain production largely shifted to irrigated lands in the 1970s. The share of dry farming declined over the years, and it accounts for less than 20 percent of arable land today (Uzbekistan Agriculture, 2006). Rapid population growth necessitated continuous expansion of irrigated areas over the years. The total area under irrigation increased from 2.2 million hectares in 1953 to 4 million in 1985. Introduction of new irrigated lands slowed down considerably after 1985 and stopped almost completely after independence. This slowdown in the last 20 years was due not only to increasingly acute budget constraints, but also to the realization that the potential for irrigation expansion had been largely exhausted and new reclaimed areas were of marginal quality for use in agriculture. The irrigated area has remained static at 4.2 million hectares since 1990 (Uzbekistan Agriculture, 2006).

THE LEGISLATIVE FRAMEWORK FOR AGRARIAN REFORM⁴

Inherited Structure

As in all other Soviet republics, agriculture in Uzbekistan was traditionally organized in a dual system, in which large-scale collective and state farms coexisted in a symbiotic relationship with quasi-private individual farming on subsidiary household plots. The large-scale farms were the backbone of commercial agriculture, feeding agricultural products into the state-controlled distribution system. Yet the subsidiary household plots produced much in excess of their subsistence

³Respectively, these are operators of traditional household plots and of more recently established independent family farms (see below).

⁴This section draws on Chertovitskiy and Akbarov (2007).

needs, and typically sold their surplus products to the local large-scale farm, to the state-controlled consumer coop network, and partly also in nearby towns, where the bazaar was a well-established traditional institution (Lerman et al., 2004). While cultivating only 3 percent of arable land, the household plots consistently accounted for 20–25 percent of Uzbekistan’s gross agricultural product during the last decades of the Soviet era, a much higher proportion than their share of land. This was accomplished mainly by concentration in livestock production. Since 1970, the country’s households had more cattle in absolute numbers than did its collective and state farms combined (CIS, 2006).

In addition to livestock production, the small household plots specialized in labor-intensive horticulture, while scale crops requiring purchased inputs and mechanization, such as cotton and grain, were grown mainly by collective and state farms. This dual specialization within agriculture was to a large extent the result of a conscious government strategy, because in many countries cotton is grown by smallholders without sophisticated machinery. The emphasis on large-scale cotton fields and mechanized picking (57 percent of all cotton grown in 1990 was picked by machines) was an outcome of Soviet ideology for the industrialization of agriculture.

The Process of Land Reform

The current phase of agricultural reform in Uzbekistan began in 1989, more than two years before independence, as a natural extension and adaptation of Gorbachev’s attempt to increase food production and improve farm efficiency in the Soviet Union. The 1989 legislation proceeded on the dual track of giving more land to households and encouraging the restructuring of large-scale farms for the sake of efficiency. Over less than two years, the total area in the household sector increased by 60 percent from 250,000 to 400,000 hectares, as the maximum plot size on irrigated land was raised to 0.25 ha from pre-1990 norms of 0.16 ha in collective and 0.08 ha in state farms. This initial phase of the reform process also spelled out the first principles of farm restructuring through creation of autonomously operating subdivisions and intra-farm family leaseholds in large-scale collective and state farms, which were now allowed to lease land to families of workers and to groups of families (Land Law, 1990).

The first examples of a fundamentally new farm structure (e.g., the peasant farm) began to emerge in 1991, as members of large-scale collective and state farms were given the option of exiting with their share of land and assets in order to undertake private farming outside the existing collectivist framework. This new form of independent family farm received legal recognition in July 1992 (Law of Peasant Farms, 1992), which led to a rapid increase in the number of registered peasant farms from less than 2,000 in 1990–1991 to 50,000 in 2000–2001, and then to nearly 200,000 in 2006. The average size of peasant farms doubled over the years, rising from less than 10 hectares in the early 1990 to about 20 hectares of arable land in the early 2000s.⁵ The early reforms culminated with the adoption of a new Land Code in April 1998 (Land Code, 1998), which reaffirmed the Soviet tradition of exclusive state ownership of all land while introducing significant measures of land tenure and farm structure reform.

Ownership and Tenure of Land

The principle of state ownership of land, which prevailed in Russia and the original Soviet republics since October 1917, was adopted in Uzbekistan in December 1925, when the country became part of the Soviet Union. After independence exclusive state ownership of land was incorporated in the new Uzbek Constitution of December 1992 and subsequently reiterated in the 1998 Land Code. Agricultural land is allocated to users by the state, but without any rights of transfer. Land held by families in lifetime inheritable possession cannot be sold, given away as a gift, or exchanged; land

⁵This is comparable to the average farm size of 20 ha in Ukraine and 40 ha in Russia (see CIS, 2006).

leased from the state by individual users cannot be subleased.⁶ Farmers pay for the use of state-owned land in the form of land tax, but no “downpayment” is required when the land is allocated.

The official rationale against private ownership of land is twofold: first, it includes the universal argument about the need to avoid speculation in land and accumulation of large tracts in the hands of absentee owners; second, it relies on the specific Uzbek reality, where land is useless without water, and water is a national resource delivered by a state-run irrigation system. In retaining exclusive state ownership of land, Uzbekistan followed what was the accepted practice among most of its Central Asian neighbors in the early 1990s and consciously departed from the policy of Russia and Ukraine, which legalized private land ownership in 1992. (Lerman et al., 2004). In 2008, however, Uzbekistan remains one of only two former republics of the entire former Soviet Union in which all agricultural land is state owned (Tajikistan is the second).⁷

Land is the only productive asset of Uzbekistan that cannot be owned privately (either by individuals or collectives). The new constitution declared that “the economy of Uzbekistan, evolving towards market relations, is based on various forms of ownership” (Constitution, 1992). It explicitly allowed “private property, along with other types of property.” The Law of Property (1990) recognizes three main forms of ownership. These are private property, collective (*shirkat*) property, and state property (including municipal). Property of foreign investors and international organizations is introduced as a distinct, fourth category. Private property in Uzbek law is interpreted as the property of individuals. The definition of collective property is broader than usual, for it includes partnerships, cooperatives, joint-stock companies, and generally all shareholder structures as well.

The sweeping universal restrictions on transactions in land prevent the emergence of land markets and place Uzbekistan among a rapidly shrinking minority of former Soviet republics that adhere to non-market mechanisms of land management. Tajikistan, despite maintaining state ownership of agricultural land, has made land use rights transferable and Turkmenistan, recognizing notional private ownership of land, is the only other Central Asian country that still prohibits all land transactions. Uzbekistan’s other neighbors, Kazakhstan and Kyrgyzstan, recognize private land ownership and allow relatively unrestricted transactions in land. In other former Soviet republics, such as Russia, Ukraine, Moldova, and the three Transcaucasus states, the initially imposed restrictions on transactions have been largely eliminated. In the absence of functioning land markets, users cannot adjust the size of their holdings at will: they cannot easily acquire additional land so as to increase production; nor can inactive users dispose of their unnecessary land by transferring it to more active or efficient users. In the present situation, for instance, livestock farmers facing a shortage of arable land for feed crops cannot turn to elderly or infirm neighbors and lease their land for crop production. All told, the absence of land markets enabling transfers of land among users impedes efforts to improve the efficiency of agriculture.

Changing Farm Structure

Three types of farms were recognized by 1998 land legislation in Uzbekistan (Land Code, 1998): (1) traditional household plots were renamed “dekhkan farms”; (2) large-scale collective and former state farms were classified as agricultural production cooperatives (*shirkats*);⁸ and (3) a new category of peasant farms (*fermerskiye khozyaystva*) was introduced, falling between the small dekhkan farms and

⁶A form of subleasing—“intrafarm leasing”—is allowed only to worker families within a collective farm.

⁷Belarus retains state ownership of agricultural land intended for commercial farming, but recognizes private ownership of household plots.

⁸Other organizational forms such as joint-stock societies, limited liability companies, partnerships, etc., also were allowed in agriculture.

the large-scale shirkats. Each of these organizational forms received a special law of its own, and the three new laws—the Law of Dekhkan Farms (1998), the Law of Peasant Farms (1998), and the Law of Shirkats (1998)—were passed simultaneously with the Land Code in April 1998. The main characteristics of the three farm types are summarized in Table 1.

Table 1. Main Characteristics of Different Farm Types in Uzbekistan			
Indicator	Dekhkan farm	Peasant farm	Shirkat (agricultural enterprise)
Basic definition	Partially commercial farm based on a household plot	Independent commercial farm organized as a legal entity	Large-scale corporate farm based on membership shares with private ownership of assets
Utilized labor	Family members	Mainly family members, with some hired help	Members and hired workers
Land allocation	Arable land in the village	Prime shirkat land acquired in return for membership shares ^a	Prime agricultural land around the village
Land tenure	Lifetime inheritable possession	Long-term lease (10–50 years)	Permanent possession for agricultural purposes
Ownership	Workers of agricultural enterprises, rural employees, pensioners	Any adult person with sufficient agricultural qualifications or experience ^b	Members-shareholders
Production specialization	Vegetables, livestock	Any crop or livestock	Mainly scale crops (wheat, cotton)
^a Also reserve land, unutilized shirkat land, land of unprofitable shirkats, and land in partially irrigated areas.			
^b Typically a former worker of an agricultural enterprise.			
<i>Source:</i> Compiled by the author on the basis of the four legislative acts passed in April 1998 (Land Code, 1998; Law of Dekhkan Farms, 1998; Law of Peasant Farms, 1998; and Law of Shirkats, 1998).			

Shirkats and other agricultural enterprises can be viewed as corporate farms, while dekhkan farms and peasant farms are two components of the individual or family farm sector. The main difference between these two components of the individual farming sector is that of size.⁹ Moreover, members of peasant farms are self-employed, whereas household plots are run by families whose members typically also have a job in some agricultural or non-agricultural organization. These two factors are typical of household plots and peasant farms in all CIS countries, and likely reflect deep behavioral and psychological differences between the two types of farming.

A third important difference between dekhkan and peasant farms is linked to specific land tenure arrangements in Uzbekistan. Peasant farmers lease their land from the state, and the lease contracts specify in exact detail areas that have to be sown in cotton and wheat—the country’s two strategic crops for which state orders are maintained. The Law of Peasant Farms (1998) further stipulates that leased land should be cultivated with due diligence in order to yield a certain minimum harvest of cotton and wheat per hectare. The October 2003 presidential decree accompanying the new strategy for the development of peasant farms (Strategy, 2003) bluntly states that any deviation from the sowing pattern prescribed in the land lease contract is a grave violation constituting grounds for the termination of a farm’s lease. Through these tenure-linked obligations the peasant farmers have actually inherited the burden of fulfilling the state orders for cotton and wheat that had been traditionally borne by Soviet collective and state farms and more recently by the shirkats. Thus, peasant farmers have become the state’s official suppliers of these strategic commodities. Dekhkan farmers, on the other hand, are free from state orders. They receive their land in lifetime inheritable possession without strict obligations, and are thus free to grow and produce whatever they wish on their small plots.

A fourth highly significant difference, also specific to Uzbekistan, concerns the ability to participate in land market transactions by leasing additional land from the state. Peasant farmers are allowed to

⁹While dekhkan farms have on average 0.2 ha of land, the average peasant farm has around 15 ha.

bid in official tenders for tracts of irrigated land that become available for allocation (usually when other farmers give up some of their land or go out of business). This is an acceptable market mechanism for farm enlargement. Dekhans, on the other hand, are limited by law to 0.35 hectares of irrigated land per family and cannot bid in such tenders. The only way to enlarge a dekhkan farm is to request (from district authorities) access to low-quality unirrigated land (up to 2 hectares), including an undertaking to ameliorate the additional land for cultivation at the petitioner's expense (Land Management Committee, 2008).

It was originally thought that the transformation of collective and state farms into production cooperatives and private agricultural companies would dramatically improve their efficiency and help them advance from chronic losses to new profits. In the 1990s, all farm-reorganization programs in Uzbekistan stressed the goal of restructuring loss-generating enterprises, and various pilot projects were implemented with the objective of transforming them into profitable farms. This strategy espoused the traditional socialist ideology of economies of scale ("large is better") and accordingly strove to achieve "horizontal transformation" of inefficient large-scale enterprises into hopefully efficient large-scale corporate farms. This strategy was doomed to fail, as experience in all CIS countries shows, and the shirkat phase of Uzbek agriculture was short-lived. The 1998 Land Code introduced the shirkat as the country's new organizational form that would make agriculture efficient and profitable; it was decreed at that time that all collective farms and other agricultural enterprises should reorganize as shirkats by 2001. In early 2008, however, very few remain in business.¹⁰

The land reform legislation that emerged in Uzbekistan after 1989, and especially in 1998, proved resilient enough to take the country through three major waves of farm restructuring. The first involved a strengthening of household plots and initial attempts at internal reorganization of agricultural enterprises through introduction of independent subdivisions and intra-farm family-based leases (1989–1997); the second wave mainly focused on formal reorganization of traditional collective farms into shirkats (agricultural cooperatives) simultaneously with further strengthening of household plots (now called dekhkan farms) and establishment of peasant farms as an entirely new organizational category (1998–2002); finally, the third, starting in 2003, boldly shifted the agricultural sector to predominantly individual farming—dekhkan farms in livestock production, peasant farms in crops—while restricting the role of corporate farms (agricultural enterprises) to highly specialized operations.

OUTCOMES OF LAND AND LIVESTOCK REFORMS

Changes in Land Use

The beginning of land reform in 1989 had an immediate impact on the rural population. Total agricultural land allocated to household plots (called dekhkan farms today) doubled from about 200,000 to 400,000 hectares in less than two years, and then continued to grow to 600,000 by 1995–1997. Despite this trebling of family holdings in the early 1990s, the household plots accounted for less than 3 percent of all agricultural land up to 1997 and agricultural enterprises—former collective and state farms—continued to dominate Uzbek agriculture. It is only the second phase of land reform, following the adoption of the new Land Law and related farm legislation in 1998, that triggered highly significant shifts in the established pattern of land use in Uzbekistan. The land controlled by

¹⁰The hopes placed in this old-new organizational form did not materialize. In 2003, a new strategy abandoned the unprofitable shirkat and shifted emphasis to peasant farms as the optimal organizational form for long-term development of agriculture (Strategy, 2003). This new strategy opened the door to "vertical transformation"—i.e., transition from large-scale corporate farms to much smaller family farms with a clear commercial orientation. As a result, the number of shirkats declined rapidly from over 2,000 in 2003 to 314 in 2006 as their land was broken up into relatively small allotments, and the remaining shirkats are slated to be dismantled into peasant farms in 2007–2008.

agricultural enterprises began to shrink rapidly, as most of it shifted to peasant farms—a new form of individual or family-based farming recognized by the 1998 Land Code and the associated Law of Peasant Farms. This shift from corporate farms (agricultural enterprises) to individual farming is particularly striking when we consider the changes in the use of arable land. Figure 1, based on Uzbekistan (2005) and Uzbekistan Agriculture (2006), shows the rapid shrinkage of arable land used by corporate farms after 1998 (bottom layer) and the corresponding increase in arable land used by peasant farms (light grey wedge in the middle), while the arable land in household plots remains virtually constant (top layer). The figure clearly indicates that most of the land in the individual sector is represented by peasant farms rather than by household plots.

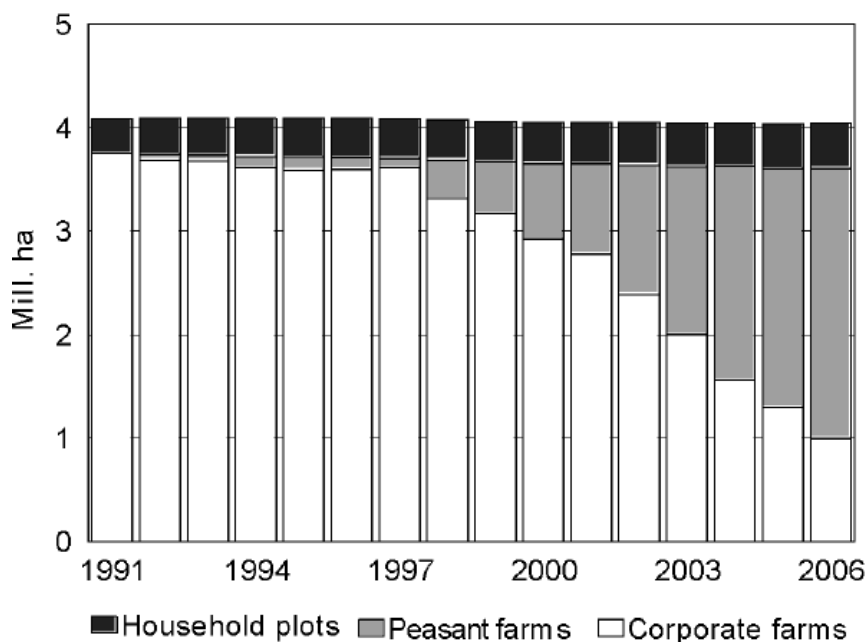


Fig. 1. Use of arable land by farms of different organizational forms, 1991–2006.

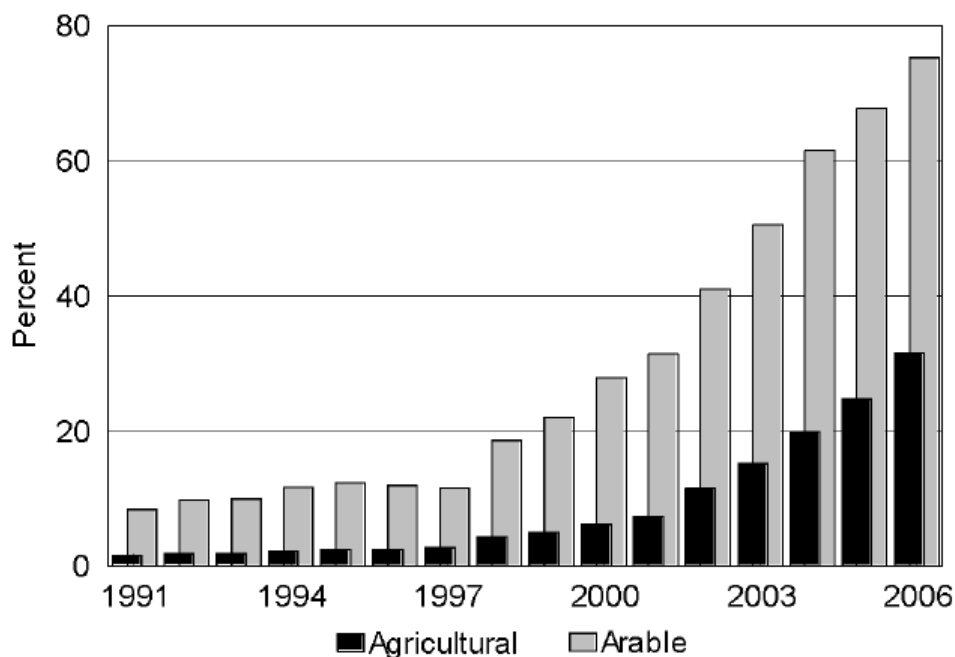


Fig. 2. Share of agricultural and arable land in individual use (dekhkan and peasant farms), 1991–2006.

A generally similar pattern of change is observed for all agricultural land, which in addition to arable land also includes pastures, meadows, and land in orchards and vineyards.¹¹ Here the decline of agricultural enterprises is less pronounced than in arable land due to their relatively high proportion of pastures: it is mainly arable land, not pastures, that is reallocated from agricultural enterprises to peasant farms in the process of reform. As a result of these changes in land use, the share of the individual farming sector—both household plots and peasant farms—increased from about 3 percent to 30 in agricultural land since 1991. The share of individual farms in arable land rose even more dramatically, and approaches 80 percent, as shown in Figure 2, based on the same sources as Figure 1.¹²

Changes in the Livestock Sector

Alongside the increase in land use, the reform has led to a substantial increase in cattle grazing in individual farms, as shown in Figure 3, compiled from CIS (2006) and Uzbekistan Agriculture (2006). The specific pattern of change in livestock differs from that in land tenure. Already during the Soviet era more than half of the cattle were in the care of rural households.¹³ After 1990, and especially after 1995, as large state-owned livestock complexes were privatized and broken up, the number of cattle in enterprises decreased, while the number in rural households increased rather sharply. The overall outcome of these divergent changes was a marked increase in the total number of cattle in Uzbekistan (from 5 to 7 million head), due entirely to the increase in the household sector, which more than offset the decline in the enterprise sector (Fig. 3). Peasant farms play a distinctly marginal role in livestock, despite the government's efforts since the early 1990s to encourage specialization in this sector.¹⁴

The overall share of the individual sector (dekhkan and peasant farms combined) has reached 96 percent of cattle and 80 percent of sheep and goats, with most of these animals found in household plots.¹⁵ It is much higher than the share of the individual sector in land use, and we can say that Uzbekistan's livestock sector is dominated by dekhkan farms (i.e., household plots). While dekhkan farms are dominant in that sector, the average dekhkan farm has only 1.4 head of cattle and 0.8 cows, compared with 42 head of cattle and 13 cows in livestock-oriented peasant farms. The bulk of the country's cattle herd is thus held in an immense number of very small household farms.¹⁶

The increase of the cattle herd, and especially the number of cows, in the process of reform is reflected in an increase of the share of livestock production in Uzbekistan's gross agricultural output (GAO). Livestock production increased from 30–35 percent of GAO in the pre-1990 period to 45–50 percent since 1997. The increase in the importance of livestock production in Uzbekistan in recent

¹¹ A notable feature of changes in agricultural land is the overall decrease in land use by all categories of agricultural users. Comparing the data on land used in farms (as reported by the Ministry of Agriculture) and the available agricultural land as reported by Goskomzem (the land monitoring authority), we conclude that abandoned agricultural land, i.e., land not claimed by agricultural users, has reached 6 million hectares in recent years—nearly one-quarter of the total stock of agricultural land in Uzbekistan (Uzbekistan, 2005; Uzbekistan Agriculture, 2006). This unclaimed land primarily comprises pastures, as virtually all arable land appears to be allocated to users.

¹² Most of the land in the individual sector is in peasant farms, not household plots (see Figure 1).

¹³ Compare this number with the 3 percent of agricultural land and 10 percent of arable land in household plots during that period.

¹⁴ Cattle in peasant farms increased over time, but do not exceed 5 percent of the total herd in the country. Peasant farms play a much more central role in crop production, as reflected in their large land endowments, which reached 65 percent of arable land and nearly 30 percent of agricultural land in 2006 (see Fig. 1).

¹⁵ Agricultural enterprises have no role in the livestock sector except for a small number of livestock selection farms, experimental stations, and specialized karakul sheep operations in the desert.

¹⁶ Uzbekistan's 4.5 million households keep 6 million head of cattle and 2.7 million cows—more than 95 percent of Uzbekistan's herd.

years can be best judged by comparing it with such traditional livestock-producing countries as Russia, Ukraine, Belarus, Kazakhstan, and Kyrgyzstan. The share of livestock production in GAO of these countries dropped from 55–60 percent before 1995 to about 45 percent in recent years, while that in Uzbekistan increased to about this level (CIS, 2006).

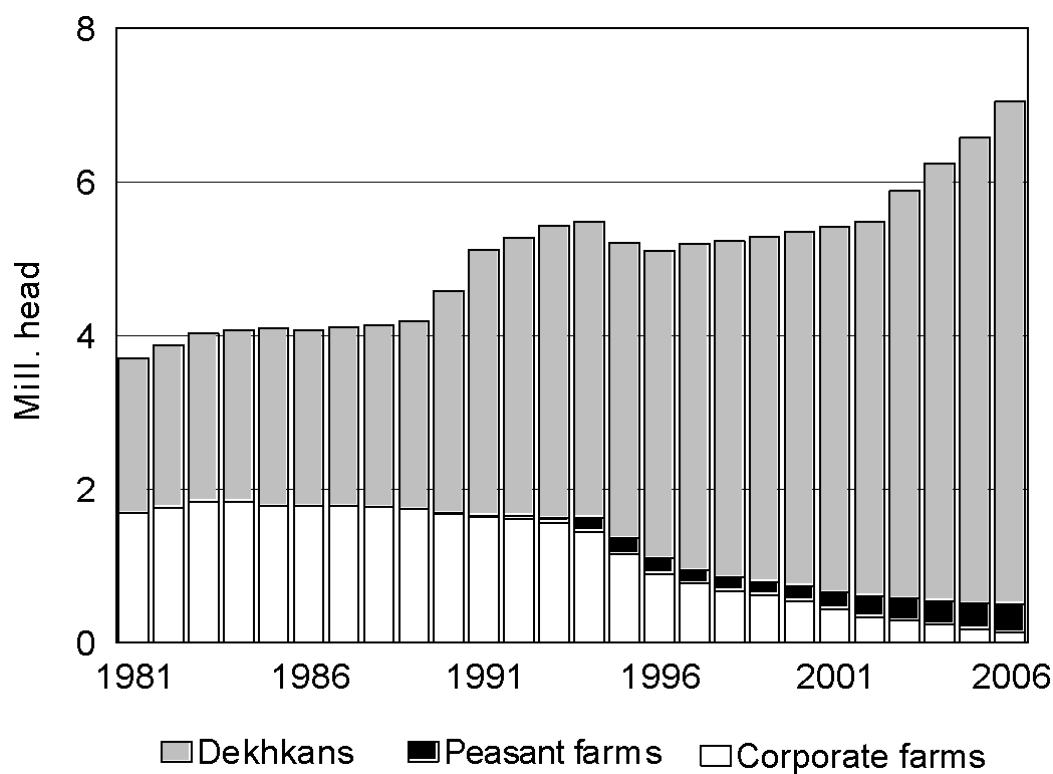


Fig. 3. Cattle herds in farms of different organizational forms, 1981–2006.

Feed Base and Milk Yields

The increases in livestock herds have not been matched by corresponding increases in the production of feed crops for animals. On the contrary, the livestock feed base has shrunk dramatically since 1991, aggravating the loss of pastures noted above. After increasing from 700,000 to 1,100,000 ha during the last decade of the Soviet period (between 1980 and 1991) it dropped to about 500,000 ha in the late 1990s and continued to decline to less than 300,000 ha in 2004–2005 (see Fig. 4 based on CIS, 2006 and Uzbekistan Agriculture, 2006). The land released from feed crops was mainly allocated to wheat as part of the state’s strategy to achieve self-sufficiency in food during the early years of independence.¹⁷

The shrinkage of the feed base continued despite the rapid growth in the total herd count. As a result, the area under feed crops per head of cattle was cut in half from 0.20 ha/head in the 1980s to 0.10 in the 1990s, standing today at less than 0.05 ha/head (i.e., 25 percent of the steady-state level in the 1980s). Paradoxically, the decline in areas cropped to feed did not affect adversely the milk yields, which have remained fairly constant (and very low) at about 1,600 kg per cow per year since 1990.

¹⁷Because the country’s agricultural land is state owned, cropping patterns are predetermined centrally on the basis of state plans for the production of the two main cash crops—cotton and wheat. Any changes in cropping patterns— both in the past and at the present—require top-level government approval. Farmers are not free to increase the areas under feed crops to their previous levels, as this will inevitably affect the areas under cotton and wheat—the two strategic crops subject to state production orders.

This may be due to the fact that the average milk yields in Uzbekistan are predominantly determined by milk production in the dekhkan farms, which in any event do not have much land to allocate to feed crops; they typically send their cows to graze in the open, on harvested fields, along the roads, and near waterways, remaining perversely independent of both feed crop harvests and formal pastures.

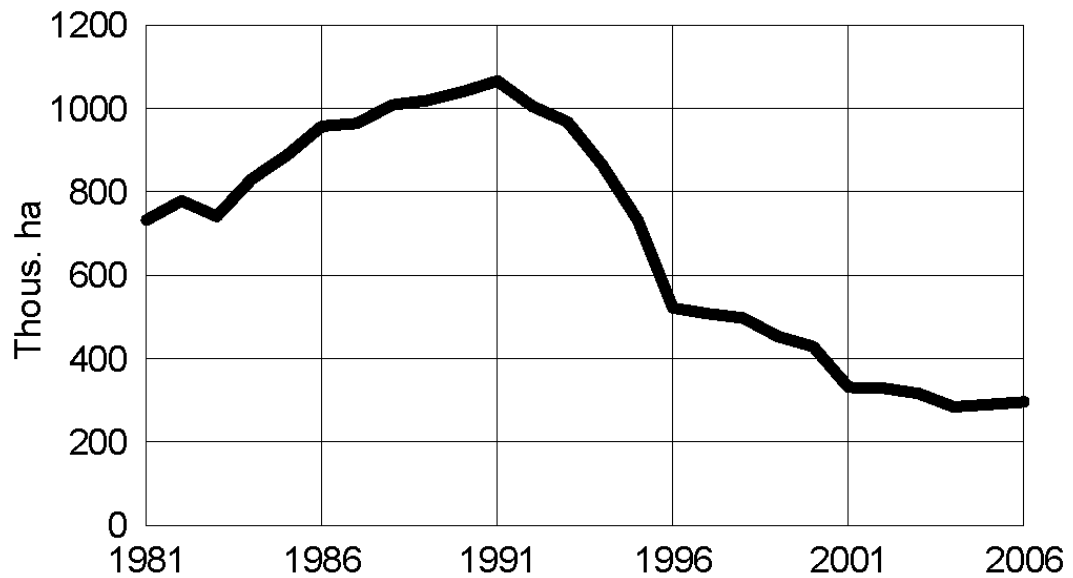


Fig. 4. Area under feed crops, 1981–2006.

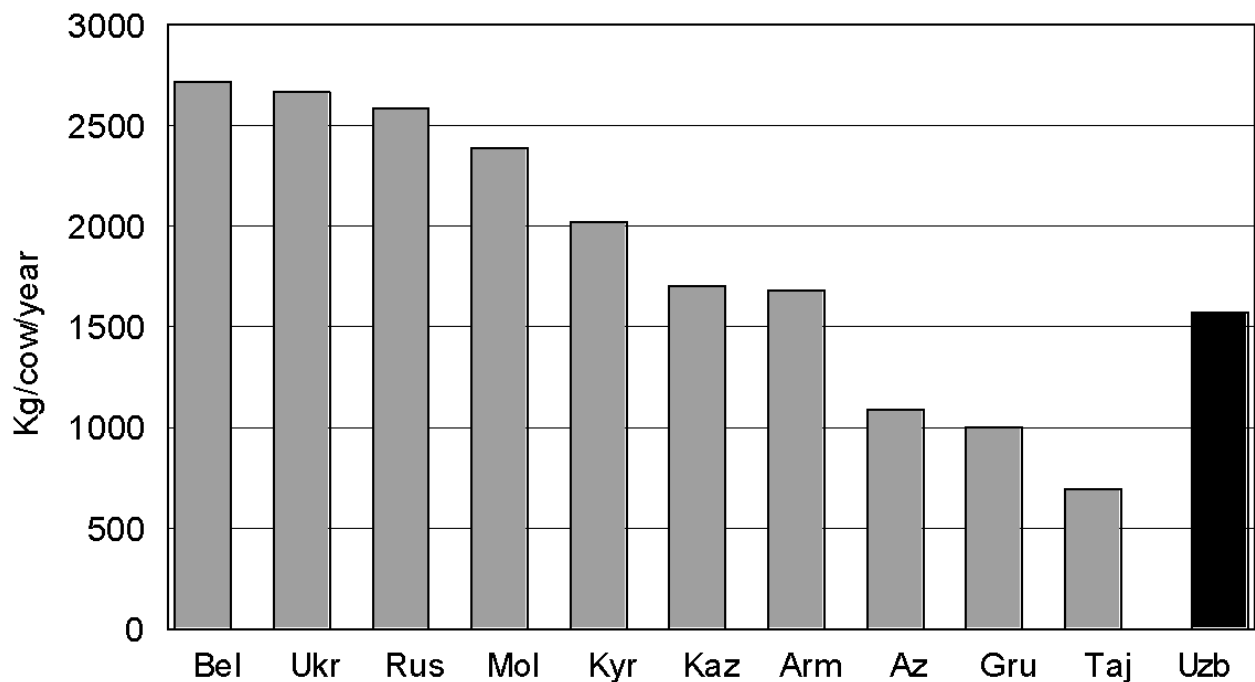


Fig. 5. Milk yields in Uzbekistan and other CIS countries, averages for 1991-2005.

The country's milk yields show a very slight increase over time—from barely below 1,500 kg per cow per year in the 1980s to slightly more than 1,600 kg since 2000. These are very low yields by comparison with Europe and the United States (ca. 8,000 kg per cow per year) or Israel (11,000 kg per cow per year) (IFCN, 2006). More troubling than the comparison with Western economies is the fact that Uzbekistan's milk yields are substantially lower than in other CIS countries (2,000–2,700 kg per cow per year in Belarus, Ukraine, Russia, Moldova, and Kyrgyzstan) and exceed only those in Azerbaijan, Georgia, and Tajikistan (see Fig. 5, based on CIS, 2006). Attempts to improve milk yields have recently been aided by policy measures formulated in a special presidential decree in March 2006 (Livestock Decree, 2006). The decree was intended to increase the number of cattle or cows in each family and to improve access of dekhkan farms to livestock support services, such as feed distribution channels, veterinary medicine, and artificial insemination.

Agricultural Production and Productivity

The differential changes in the distribution of land and livestock by farms of different types have led to striking modifications in the structure of Uzbekistan's agricultural production, especially after 1997–1998. The production in enterprises dropped from about 35 percent of the total in 1997 to just 6 percent in 2006. Output in dekhkan farms remained fairly stable at slightly over 60 percent since 1997, while that in peasant farms grew from 3 percent in 1997–1998 to nearly 32 percent in 2006. Figure 6, based on Uzbekistan Agriculture (2006), shows that agricultural production has since 1997 shifted from corporate enterprises to peasant farms. The decrease in corporate farms (bottom layer) has been compensated by a corresponding rise in the production of peasant farms, while dekhkan farms (top layer) have retained their dominant and relatively constant share throughout the entire period.¹⁸

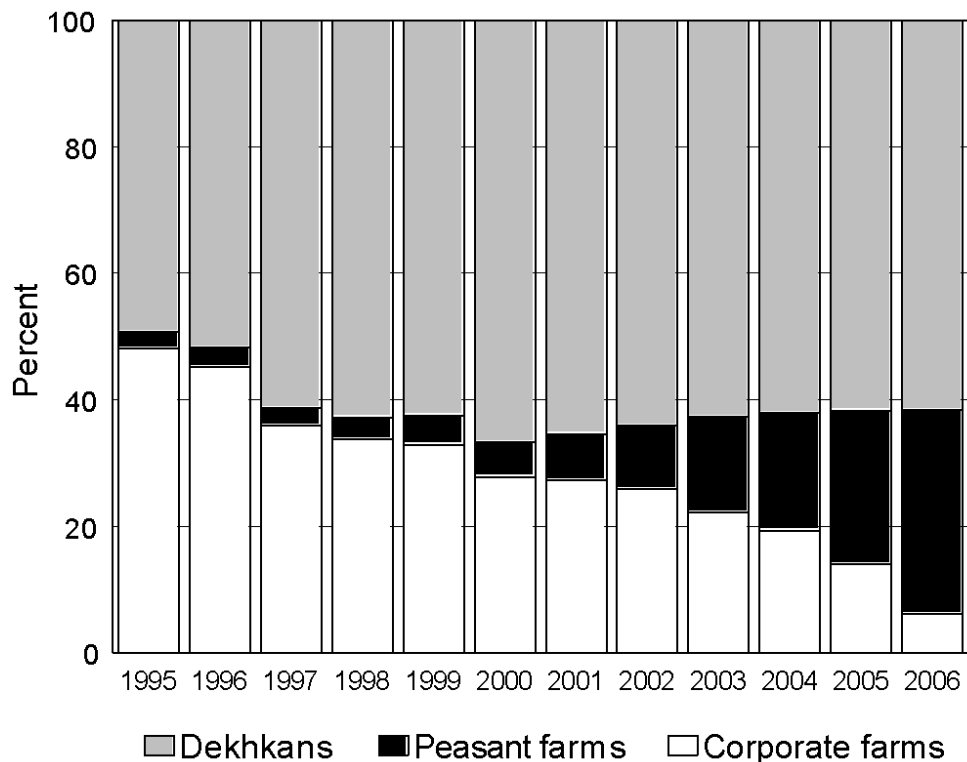


Fig. 6. Structure of gross agricultural output by farm type, 1995–2006.

¹⁸Prior to 1997, with peasant farms at their initial formative stage, it was the dekhkan farms that increased their share of agricultural output at the expense of the shrinking corporate enterprises.

The phenomenon of peasant farms taking over from the corporate farms is demonstrated with particular clarity in Figure 7 (based on the same source as Fig. 6), which shows the changing shares of crop production since 1995. Focusing on the years since 2002–2003, we note that while the share of dekhkan farms remains constant at around 40 percent, that of peasant farms rapidly increases at the expense of the corporate enterprises; this shift to peasant farms is consistent with that of arable land depicted in Figure 1.

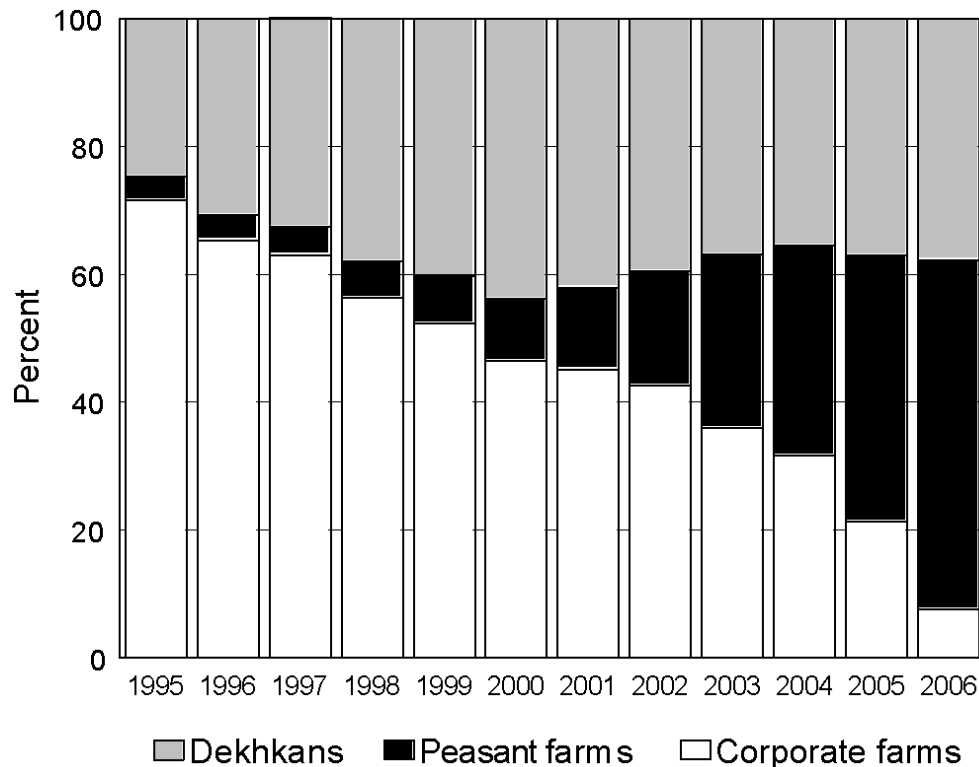


Fig. 7. Structure of crop production by farm type, 1995–2006.

With regard to livestock production, dekhkan farms continue as the dominant force, having gradually increased their share to more than 90 percent of total output in 2006. Both the corporate and peasant farms play a strictly marginal role, which is also consistent with the distribution of the herd over farms of different types (see Fig. 3).

We conclude that the second phase of reform, starting with the adoption of the 1998 Land Code and related legislation, was characterized by a dramatic shift of production (mainly crops) from the corporate to peasant farms. But it is clearly the dekhkan farms that come out ahead in the process of reform, having maintained their leading role in agricultural production throughout the period, and contributing over 60 percent of GAO. Particularly prominent in livestock production, they also are a very significant factor in crop farming, accounting for nearly 40 percent of the country’s crop output in recent years, despite their relatively small share of arable land (see Fig. 1). Ultimately, the success of agricultural reforms is measured first by growth in production and second by changes in productivity. Fortunately for Uzbekistan, the early phases of transition (up to 1997) did not involve dramatic declines in agricultural production, as in other CIS countries. Agricultural output essentially stagnated there between 1980 and 1997, but then took off, rising by more than 60 percent between 1998 and 2007. The increase in production was entirely due to the individual sector (dekhkan and peasant farms), as the shrinking output of corporate farms had eroded by more than 70 percent during this period (dropping to 30 percent of the level in 1997). The process of reform encouraging and emphasizing transition from traditional large-scale enterprises to individual farms has produced

remarkable accomplishments in growth. Spurred by individualization of agriculture, such results are not unique to Uzbekistan, for they are observed in other CIS countries that have encouraged transition to individual farming.

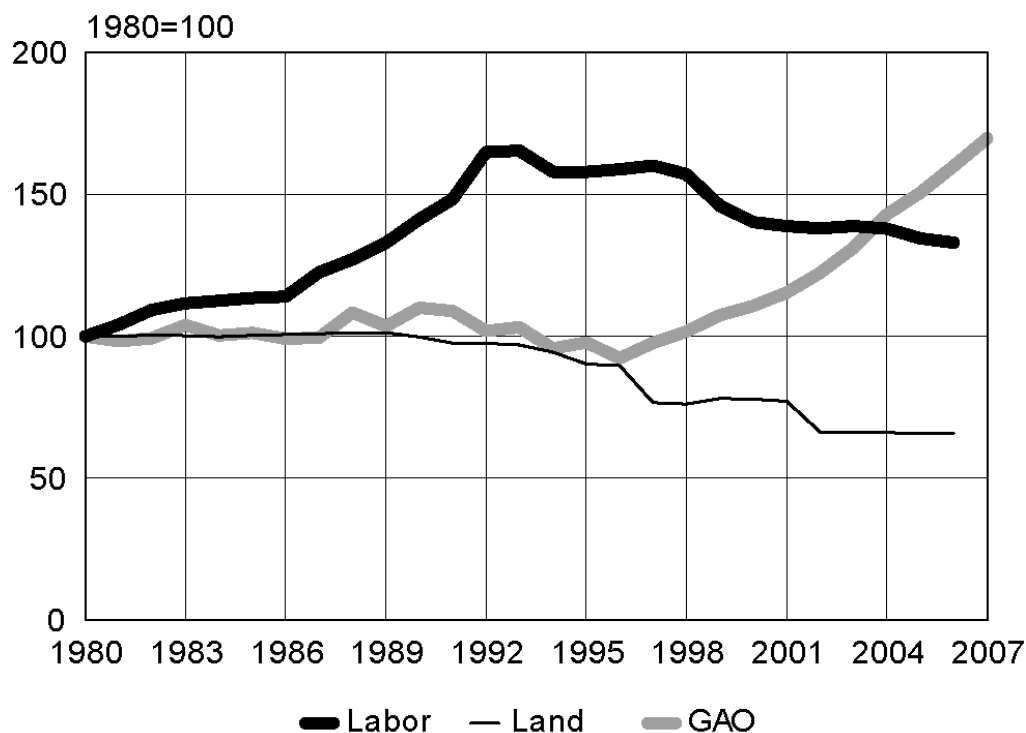


Fig. 8. GAO, agricultural labor, and agricultural land, 1980–2007, in percent of 1980 (1980 = 100).

Agricultural productivity is usually calculated as partial productivity of land (value of agricultural output per hectare of agricultural land) and partial productivity of labor (value of agricultural output per agricultural worker, including the self-employed dekhkans). More sophisticated measures rely on total factor productivity (TFP), which aggregates the partial measures into one index that allows for the entire basket of resources and inputs used in agriculture. TFP is technically difficult to calculate, but even the calculation of partial productivity measures involves certain problems as it requires a reasonable knowledge of the area of agricultural land used for production and the number of employed in agriculture (both workers for hire and self-employed). Figure 8, compiled and calculated from data in CIS (2006), Uzbekistan (2005), and Uzbekistan Agriculture (2007), shows three curves that constitute a basis for productivity calculations, namely agricultural production (grey), agricultural land in use (thin black), and agricultural employment (thick black); the curves span the period from 1980 to early 2007.

While agricultural output has increased dramatically since 1997, agricultural land has declined. This essentially means that partial productivity of land has increased, and by much more than the 60 percent rise in production. In fact, the productivity of agricultural land rose by nearly 150 percent between 1997 and 2006 due to the combined effect of increasing production and decreasing land base (see grey curve in Fig. 9, based on same sources as Fig. 8). Agricultural employment also seems to have declined rather steeply since 1997, although the reasons for this drop are not entirely clear. Based on the given curve of declining agricultural employment in Figure 8, we conclude that the partial productivity of labor also has risen strongly since 1997.¹⁹

¹⁹The rise came after a decline between 1980 and 1997 due to an increase in agricultural labor in the face of stagnating production, as depicted in the black curve in Figure 9.

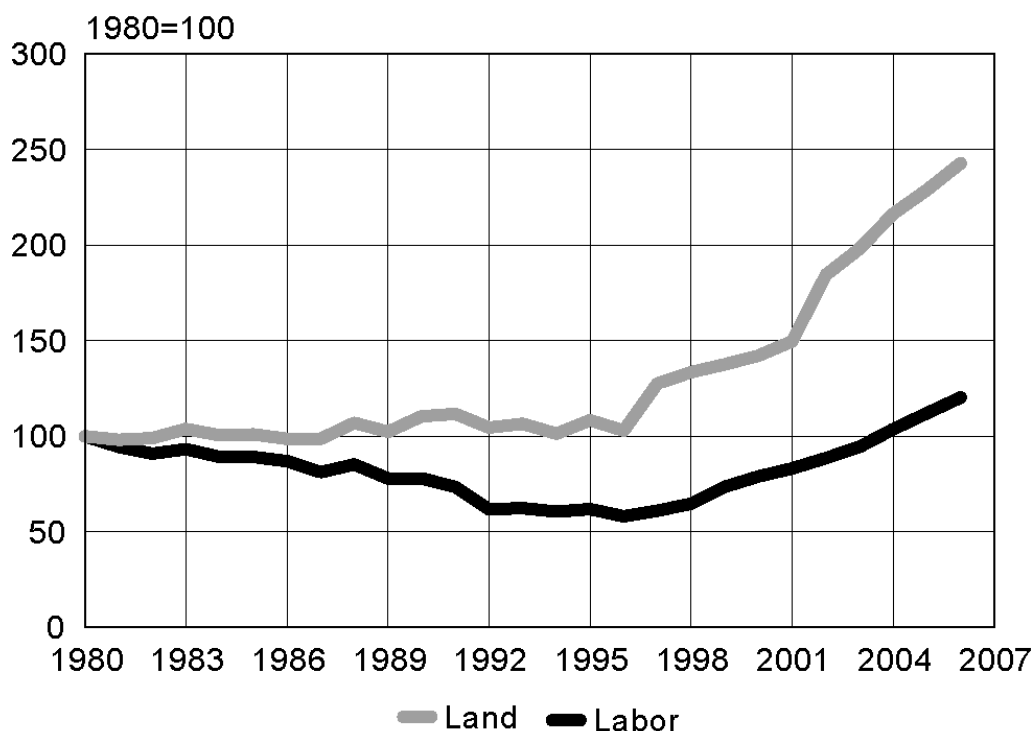


Fig. 9. Productivity of agricultural land and labor, 1980–2006.

Agricultural reforms in Uzbekistan are thus seen to have had a highly beneficial outcome, in terms of robust growth in both production and productivity. Another dimension that needs to be checked in future work is the impact of these processes on rural incomes and the standard of living of the country’s rural population. Regrettably, however, there is a lack of data to attempt such analysis at the present stage.

LESSONS FROM THE SURVEY OF DEKHAN AND PEASANT FARMS²⁰

Comparing the Dekhkans with Peasant Farms

The agricultural sector of Uzbekistan is dichotomized today into two main groups of producers—the dekhkan and the peasant farms—and both groups of producers were suitably represented in the survey conducted in August 2007. Dekhkans have only a small household plot, comprising the *tomorka* (the plot around the house) and often also an additional one somewhere on the periphery of the village. Peasant farmers have a relatively large plot received for commercial farming in addition to a household plot similar to that of all other rural residents. Farmers are in turn divided into crop (farmers who have land but no livestock) and livestock farmers (who in addition to land also keep animals). Table 2 presents some characteristics of each group.

The differences between dekhkan households and farmers are significant for all variables. The dekhkans have smaller families, less land, less livestock, and lower income (both total and per capita). The difference in income is reflected not just in the means: dekhkans are observed to achieve lower incomes also when we control for land holdings and the size of the animal herd.²¹

²⁰ All data in this section are based on our 2007–2008 survey.

²¹ This becomes evident in view of the negative farm type coefficient for dekhkans in Table 5 below.

The differences between crop and livestock farmers also are generally significant, for in addition to having more livestock (obvious by definition), the latter have more land, presumably allocated to enable them to grow feed crops for their animals. Livestock farmers also earn a higher total income than crop farmers. The difference in per capita income, however, is not significant between these two groups, mainly because livestock farmers have larger families.

Substantial differences also are observed in cropping patterns between the livestock and crop farmers, there are notable differences in land use between peasant farms and household plots. We start with a comparison between livestock and crop farmers. The main difference here (in addition to that in farm size; see Table 2) is in the area under feed crops. Livestock farmers have nearly 30 percent of their land under grasses and feed roots, plus another 14 under corn, which also is mainly used for feed (Table 3). Crop farmers, on the other hand, devote only 3 percent of their sown area to feed crops and corn; they have no livestock and do not need feed.²² Wheat and cotton are the two other major crops in peasant farms, but livestock farmers allocate to these crops about one-half the area share allocated in crop farms: they have 48 percent of their land under cotton and wheat (roughly in equal proportions), while in crop farms these crops take up almost 90 percent of the sown area (slightly more cotton than wheat).

Indicators	Dekhkan households	Crop farmers	Livestock farmers	All peasant farmers
N of respondents	797	402	399	803
Household plot, ha	0.17	0.19	0.22	0.21
Farm plot, ha	--	31.74	56.21	43.90
Total holdings, ha	0.17	31.9	56.4	44.1
Household livestock, standard head ^a	2.7	4.4	2.9	3.6
Farm livestock, standard head ^a	--	--	56.8	28.2
Total livestock, standard head ^a	2.7	4.4	59.7	31.9
Total income, thous. som/month	267	451	560	505
Per capita income, thous. som/month	47	74	90	82
Family size	6.0	6.6	7.2	6.9

^a Livestock in this table represents all farm animals (cattle, sheep, goats, poultry, etc.), expressed in standard head.

Crops	Peasant farms			Household plots	
	Livestock farmers	Crop farmers	All peasant farms	Dekhkan plots	Peasant farms
Cotton	24.1	48.2	34.5	0	0
Corn	13.7	1.7	8.6	19.5	15.9
Wheat and other grains	24.2	40.5	31.2	18.5	22.9
All grains	44.2	44.6	44.4	38.0	33.5
Horticulture	2.5	5.9	4.0	47.9	52.6
Feed crops	29.2	1.3	17.1	14.1	13.9
All cropped	100.0	100.0	100.0	100.0	100.0

^aThe average cropped area in ha was 36.4 for the livestock and 26.7 for the crop farmers (31.5 for all peasant farms) and 0.14 for the household plots of the dekhkans and 0.15 of peasant farmers.

Cotton characterizes the main difference between the use of land in peasant farms and dekhkan plots, for it is only grown on peasant farms, where this traditional cash crop accounts for more than one-third of the cropped area, whereas dekhkan plots have none of it (Table 3). Instead of cotton, dekhkans concentrate on horticulture, growing potatoes, vegetables, melons, fruits, and grapes, which

²²Although in principle they could grow feed for sale to livestock farmers and dekhkans who need it, this is prohibited by their obligation to grow wheat and cotton for delivery to the state.

dominate household plots, taking up roughly half the cropped area. Feed crops, corn, and other grains account for the rest of the cropped area in roughly equal proportions (15 to 20 percent in each crop category). The share of land under feed crops and corn is close to that in livestock farms (about 35 percent in dekhkan plots compared to 45 in livestock farms). The emphasis on corn at the expense of wheat in dekhkan plots probably indicates that this cereal is grown as feed for household animals, while peasant farms (especially crop farms) concentrate on wheat as their cash crop. There are no major differences in the use of household plots cultivated by the dekhkan or other farmer families.

It may be argued that peasant farmers must grow cotton (and wheat) by virtue of the conditions imposed on them by the state's land leasing contracts. Dekhkan farmers, on the other hand, are free from such obligations to the state and presumably avoid cotton as an unprofitable crop. To the extent that they grow wheat, it mainly feeds their animals and yields flour for the family.

There are notable differences in the structure of income of dekhkans and peasant farmers (Table 4). The dekhkans rely heavily on wages from outside employers, while peasant farmers earn income primarily from farming—an understandable difference given the disparity in the size of farms. The small size of dekhkan plots is not sufficient to ensure full-time employment for family members, who accordingly are compelled to look for outside work. Peasant farms are much larger and thus do not leave time for outside occupations. Dekhkan families also receive a much greater share of remittances from family members who work abroad, for the small size of the family plot tends to force some members to emigrate in search of work.

Table 4. Structure of Family Income of Dekhkans and Peasant Farmers in 2007 (in percent)

Source of income	Dekhkans	Peasant farmers
Household plot ^a	25.5	21.0
Peasant farm ^b	--	51.1
Wages	37.8	8.6
Non-agricultural business	9.5	3.7
Remittances	7.1	0.8
Other transfers	20.1	14.8
Total monthly income	100.0 ^c	100.0 ^d

^aSales and consumption, with 15.1 percent attributed to crops and 10.4 to livestock in the dekhkans.
^bSales and consumption.
^c267,000 som.
^d505,000 som

Family Income and Standard of Living

The essence of land reform in all CIS countries is to increase the land holdings of rural populations. Our survey shows that both the total family and per capita incomes grow steadily in tandem with land holdings. While the result for *total* income is intuitively trivial (more land, more production, more income), the result for *per capita* income is not. Figure 10 shows how per capita income increases in relation to the land holdings of dekhkan and peasant farms.²³ The figure highlights an interesting feature of land distribution in Uzbekistan: the dekhkan plots do not exceed one hectare, while the holdings of peasant farmers never fall below one (including both the household and farm plot). There is a sharp distinction between the two groups, which is reflected in the total separation between the grey and white bars in the graph.

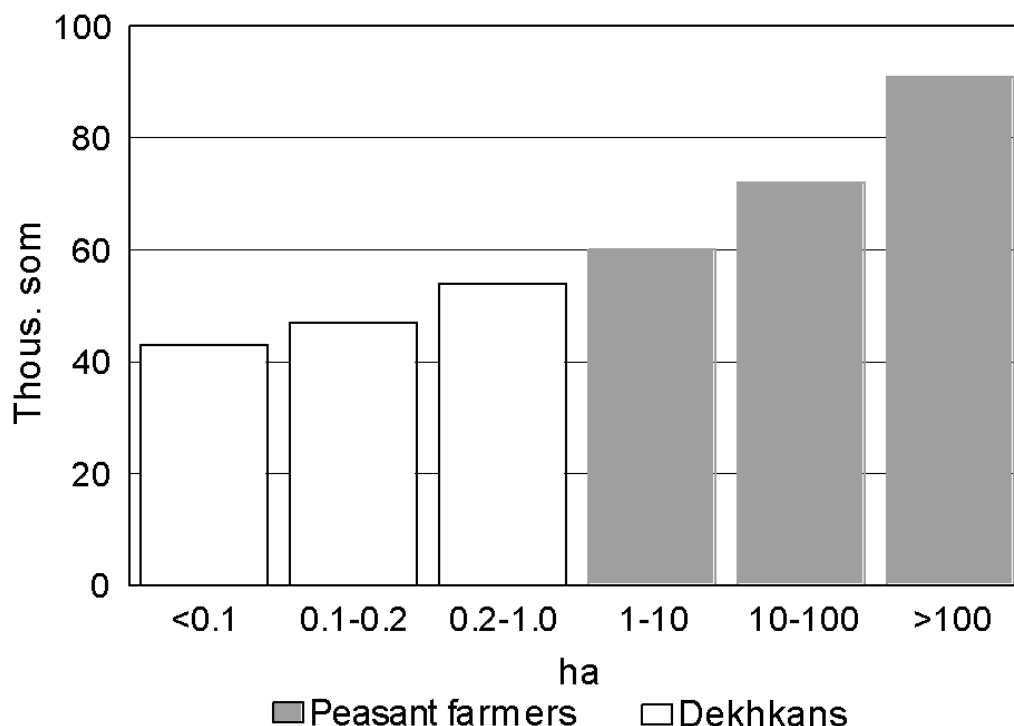


Fig. 10. Per capita income in relation to land holdings of peasant farmers and dekhkans.

Given the positive effect of land holdings on income, it is desirable to also check the effect of herd size on per capita income. This was done within a regression framework, modeling income per capita as a function of both land holdings and the number of cattle. The regression results presented in Table 5 demonstrate that per capita income indeed increases with the increase of herd size, controlling for land holdings. This conclusion holds when dekhkan households are analyzed on their own and also when they are analyzed simultaneously with peasant farms, controlling for farm type. For farmers analyzed on their own, the effect of land holdings is positive but not statistically significant, while the effect of cattle is positive and statistically significant. There are no significant differences between the “livestock” and “crop” farmers in the sample. Land holdings and cattle herd for farmers include both the dekhkan and the farm component.

The negative coefficient of farm type in Table 5 implies that, on average, dekhkans earn less per capita than farmers, controlling for land and cattle. This result is consistent with the means reported

²³In our analysis, family income includes cash from all sources plus value of own products consumed by the household.

for monthly per capita income, namely 47,000 som for the dekhkans and 82,000 for peasant farmers (the difference is statistically significant).

Table 5. Regression Coefficients for Per Capita Income as Function of Land Holdings and Size of Cattle Herd^a

Variables	Dekhkans only	Peasant farmers only	Dekhkans and peasant farmers simultaneously
Land holdings (ha)	27.4	+0.14	+0.14
Cattle herd (head)	2.6	+0.20	+0.21
Farm type effect (dekhkans vs farmers)	--	--	-23.66
Intercept	36.53	70.32	70.26
Mean values by farm type			
Monthly per capita income (thous. som)	47,000	82,000	--
Land holdings, ha	0.17	44	--
Number of cattle	2.3	28	--

^aAll regression coefficients are statistically significant at the 10 percent level, except for the coefficient of land holdings for farmers when analyzed separately. In all three regressions, R² is low (>10 percent), so further refinement of the model should be attempted.

In addition to providing quantitative information on per capita income of rural families, the survey also collected qualitative information on subjectively perceived standard of living. The standard of living was measured on a three-level scale—low, medium, and comfortable—based on subjective perceptions (“what the family budget buys”) as articulated by respondents in the survey. Peasant farmers enjoy a generally higher standard of living than dekhkans, with 17 percent perceiving their standard of living as “comfortable” compared to only 4 among the dekhkans. In contrast, 38 percent of the dekhkans perceive their standard of living as “low,” while only 11 percent among the peasant farmers are similarly dissatisfied (Table 6).

Table 6. Selected Indicators of Living Standards in Dekhan Families and Peasant Farms, 2007^a

Indicator	Low		Medium		Comfortable		Entire sample	
	Dekhans	Peasant farms	Dekhans	Peasant farms	Dekhans	Peasant farms	Dekhans	Peasant farms
Dekhans (<i>N</i> = 796)	38		58		4		100	
Peasant farms (<i>N</i> = 795)		11		72		17		100
Income and basic assets								
Total income (thous. som)	197	451	303	458	429	738	267	505
Per capita income (thous. som)	36	72	53	72	71	129	47	82
Land holding (ha)	0.16	30.0	0.18	44.0	0.19	53.0	0.17	44.0
Cattle (head)	2.0	16.0	2.4	23.0	2.1	51.0	2.3	28.0

^aMeans calculated using all observations, including those with zero values.

The percentages in Table 6 can be interpreted as the probabilities of achieving a given standard of living—low, medium, or comfortable—in dekhkan and peasant farms. We applied multinomial logistic regression to estimate the probability of achieving a given standard as a function of land holdings and other endowments, such as number of cattle. The estimates show that the probability of achieving a “comfortable” standard of living rises with increases in land holdings and number of cattle, while that of being in the lowest category decreases with an increase in land and in cattle. Thus, land and cattle—the two asset factors most immediately affected by land reform—have a direct impact on alleviation of poverty. Accordingly, the generally higher standard of living among peasant farmers is duly reflected in higher total and per capita incomes, larger land holdings, and larger cattle herds. Moreover, mean levels of income and other basic assets associated with the different categories of living standards increase as we move from the lowest to highest standards (Table 6).

Commercialization of Dekhkan Farms

Dekhkan farms are often treated dismissively by government decision makers, because they are viewed as subsistence-oriented operations that do not really justify the designation of “farm.” There are two ways of looking at commercialization: one is by estimating the percentage of households that sell at least some of their production, and the other by estimating the share of total production sold. By the first measure (percent of producers engaged in sales), the dekhkan plots appear to be a subsistence activity: nearly two-thirds of dekhkan households with cows do not sell milk, apparently consuming all of it within the family. Yet the remaining one-third do sell, and quite a lot at that—on average 60 percent of their milk production (see Table 7). Because of the high rate of sales, the average level is around 20 percent of milk produced for all dekhkan plots with cows—including the two-thirds that do not sell anything. Therefore, by the second measure—the share of output sold—dekhkan plots are not subsistence operations, because they sell a very respectable share of their milk, even allowing for large numbers of subsistence-oriented households.

Indicator	Sales in percent of production			
	None	<50	50–75	>50
<i>N</i> of milk producers	342 ^a	85	64	44
Cows/farm	1.1	1.2	1.5	1.9
Milk yield (kg/cow)	735	950	1074	1225
Milk production (kg)	739	1126	1521	2468
Size of family (<i>N</i>)	6.4	6.1	6.0	5.3
Size of plot (ha)	0.19	0.18	0.22	0.19

^a64 percent of all milk-producing dekhkan farms accounting for 40 percent of the milk produced by the 534.

The dairy orientation is dominant among dekhkan farms with cattle: 31 percent sell milk, while only 6 percent sell meat (4 percent sell both staples). There is a much greater tendency to consume milk by the household and channel most meat for sales. Dekhkan households sell only 40 percent of their milk production but fully 90 percent of their meat, with quantities reaching 1600 kg of milk and nearly 400 kg of meat on average per household. In the spring of 2008, milk was selling for 270 som per kg, whereas a kg of meat sold for 3,700 som.

Neighbors and acquaintances are the main buyers of both milk and meat forthcoming from the dekhkan farms. Other prominent sales outlets are the markets (presumably in the nearest town) and

intermediaries.²⁴ Market sales, and sales to neighbors and acquaintances, are not mutually exclusive categories, as sales to the latter also are reported by those who sell in the market or through intermediaries. On the other hand, sales through intermediaries and sales in the market are mutually exclusive for all practical purposes: dekhkans either deliver their products to an intermediary or make the effort of traveling to the market, but not both.

Commercialization levels of dekhkans rise with increases in milk yields (a measure of efficiency), in the size of the dairy herd, and hence in total production volumes through a combination of the two factors. In other words, households that produce more milk (because they have more cows and achieve higher yields) sell a higher share of their output. Thus dekhkan farms without any sales produce around 750 kg of milk per year, whereas the ones selling more than 75 percent of their output produce three times as much—2,500 kg of milk per year.

The combination of higher yields and more cows generates surplus milk, which leads to higher commercialization. Consumption by large families naturally reduces the surplus available for sale, whereas small family sizes coincide with higher levels of commercialization. Land has no statistical effect on commercialization levels in dairy production, probably because all dekhkans have roughly the same small plot (for 90 percent the size falls between 0.1 and 0.4 ha).

A decision to sell rather than consume has a major impact on income. Dichotomizing the dekhkan farms into “sellers” (i.e., those reporting some revenue from farm sales) and “non-sellers” (farms without any sales revenue), we found the monthly family income of the former to average 250,000 som (63,000 per capita) and of the latter somewhat less at 231,000 som (40,000 per capita).²⁵ All told, commercialization of dekhkan farms is both expedient for the delivery of farm products to urban markets as well as a mechanism for alleviation of poverty in rural areas.

Improving Milk Yields

Given the relatively low technological level of the agricultural infrastructure in Uzbekistan, attempts to increase milk yields (among the lowest in all of the CIS countries) ought to focus on the basics, namely genetics, feed, and animal care. In practice, this means attention to breed selection (mainly through artificial insemination and not so much through imports), feed delivery channels, and veterinary services.

Our survey results indicate that use of artificial insemination increases milk yields by more than 30 percent in both households and farms, as shown in Table 8. But only a small proportion of dekhkans (less than 5 percent) dare to rely on artificial insemination, and most continue with the traditional method of “taking the cows to the bull.” The practice of artificial insemination is more widespread in application to “commercial” cattle in livestock farms (as opposed to household cattle). Fully 12 percent of livestock farmers use artificial insemination for their “commercial” herd, while only 4 percent of farmers bother to do so for their household cattle.

Nearly 90 percent of peasant farmers are completely satisfied with the quality of artificial insemination services and generally have no complaints about the cost or access. The ones who do not use the method either have a bull of their own on the farm (53 percent) or, like the dekhkans, find it easier to “take the cows to the bull” (40 percent). Judging by the difference in milk yields, the semen from bulls used for “domestic” insemination is far inferior to the genetic material used for the artificial insemination. However, there is room for significant improvement even of the genetic material available for artificial insemination in Uzbekistan.

²⁴ Milk sales channels in a number of other CIS countries are examined in Gorton et al. (2007).

²⁵ Differences between the “sellers” and “non-sellers” were statistically significant at $p = 0.01$.

Table 8. Effect of Artificial Insemination on Milk Yields, 2007		
Use category	Artificial insemination	
	Used	Not used
Household cows		
Dekhans (<i>N</i> = 560)	993	848
Peasant farms (<i>N</i> = 476)	1382*	1011*
Entire sample	1210*	925*
Farm livestock (<i>N</i> = 352)	1518*	1120*
*Differences significant at $p = 0.01$		

Milk yields achieved by dekhkan households increase with the level of *feed sufficiency*. This fact was elicited in response to a strictly qualitative question asked to evaluate the adequacy of feed for dekhkan animals. The dekhkans characterized sufficiency on a three-level scale: insufficient, barely sufficient, and available in optimal quantities. A statistically significant increase of milk yields was observed as the quantity of feed rose from insufficient to optimal; the yields increased from 730 kg/cow/year in households with insufficient availability to nearly 930 kg/cow/year in those reporting “optimal” quantities of feed for their cattle.

The dependence of milk yields on feed sufficiency and a range of other factors was additionally explored more rigorously by regression analysis for dekhkans and livestock farmers separately. Feed sufficiency was estimated by calculating (in tons per cow) the quantity of purchased feed as well as that grown on the farm, representing, respectively, use of high-quality feed and of low-quality feed obtained by grazing on pastures. While high-quality feed sufficiency had a positive effect on milk yield, the reported adequacy of pastures did not have a statistically significant effect, likely reflecting a general tendency among dekhkans to graze their cattle on grass verges along roads, where feed quality is notoriously low. Thus, as many as 52 percent of the dekhkans resorted to that grazing strategy, unlike the livestock farmers (only 11 percent) whose milk yields therefore *inter alia* were higher.

Another interesting factor is the positive effect of human capital on milk yields—higher when the farmer or the dekhkan is more experienced and better educated. In our view, a farmer’s willingness and ability to maintain a comfortable and healthy environment for his livestock implies a requisite level of education and experience to realize that animal health and general care are as important as feeding.

CONCLUSIONS

Our analysis of family income in rural Uzbekistan shows that standards of living can be improved by focusing on ways to increase the land holdings and cattle herd of the population, especially the dekhkans. Land and cattle have an important role in poverty alleviation—a conclusion not unique to Uzbekistan, for the same result is consistently observed in other transition economies, where rural incomes and living standards are seen to rise with the size of individual farms. Further development of land markets through simplification and streamlining of leasing transactions should enable the

enterprising dekhkans and farmers to increase their holdings and thus achieve higher levels of well-being.

Despite their small size, dekhkan farms are not merely subsistence operations, as they actively engage in sale of their products. In fact, one-pail-a-day farmers sustain the dairy market in Uzbekistan.²⁶ It follows that commercialization increases family incomes and further development of marketing and distribution channels will encourage farmers to sell a greater portion of their output. Milk yields also play a role in commercialization, as dekhkans that achieve higher yields tend to produce more and thus sell a greater share of their output. Survey results clearly show that milk yields, i.e., livestock production efficiency, can be significantly increased by applying artificial insemination for breed improvement, by ensuring feed sufficiency, and by raising the level of animal care. These results for Uzbekistan essentially replicate the findings in other CIS countries, where small individual farms are observed to engage in commercial activities, where farm sizes have a positive effect on readiness to sell at least some of the output, and where commercialization increases family incomes (Lerman, 2004; Lerman, 2006; Lerman et al., 2007).

The importance of quality feed suggests the need for improvement of feed distribution channels, enforcement of feed quality standards, and also encouragement of scientific research for the development of high-yield feed crops. It is only with the assistance of science that Uzbekistan will be able to produce enough feed on its shrinking area of arable land allotted to feed crops. The positive effect of human capital highlights the need for free training and professional education of farmers; the cost of such public services would be easily recouped from additional revenues generated by increased milk yields.

The overall production and marketing efficiency of the country's livestock sector would tend to depend on efforts to correct its skewed structure. This was basically the idea behind the efforts to create livestock farmers, i.e., operators with 50–100 cows that should be able to produce and market more efficiently than one-cow dekhkans. However, livestock farmers today are a tiny minority (9,000 farmers with about 5 percent of all cattle). Instead of creating livestock farms with 50–100 cows from scratch, a better policy might have enabled the small dekhkan households to gradually increase their herd from 1 cow to perhaps 10, until they reach the limits of their managerial capacity and skills. Not every dekhkan household would grow this way, but many could take advantage of a new approach to improving their standards of living.

A better policy and approach would require a focus on animal feed, for one cannot expect efficiency in dairy production if the animals are sent to graze on stubble in the fields or on dusty grass verges along the roads. To produce feed, dekhkans need more land—more than the maximum of 0.35 ha of arable land the law allows them. Because reliance on feed purchases from farmers who grow feed crops is fraught with many obstacles in Uzbekistan, it is necessary to re-evaluate the existing land allocation procedures in order to distribute more land to dekhkans for feed production, and also abandon the current rigid practice of mandatory allocation of land areas to cotton and wheat. If farmers are given the opportunity to optimize the cropping pattern (the “freedom to farm” principle), they will have a greater incentive to produce the prescribed quantities of cotton and wheat for government procurement on less arable land. As a result, significant areas of land would be released for other crops, including feed crops such as corn and alfalfa, thus providing a sufficient feed base for larger household herds and a way to raise the standards of living of the rural population.

²⁶Informed estimates by managers of the Nestle Company in Namangan and Tashkent place milk sales from small family producers at 85 percent of the total.

The findings of our survey of Uzbekistan have immediate relevance for all its Central Asian neighbors and also for other CIS countries. The main conclusion is that rural incomes in transition countries can be increased by giving peasants control over more land. This can be accomplished not only through additional distribution of land from the state reserves, but also through allowing development of land market transactions (including land leasing). The latter requires a radical change in the prevailing bureaucratic mentality in all CIS countries: land registration procedures must be streamlined and simplified, transaction costs must be reduced, and access to land market information must be widely available. Another important conclusion is that agricultural efficiency depends on service infrastructure. This includes access to farm services (such as feed distribution and artificial insemination), marketing and supply channels, as well as provision of agricultural extension and proper training to individual farmers.

The institutional arrangements of the old Soviet system of agriculture are gone forever, and one of the striking conclusions of our survey of Uzbekistan, generalizable to other CIS countries, implies that it is no longer possible to ignore the smallholder sector. Under the present circumstances, smallholders are the dominant agricultural producers across all of Central Asia and the CIS and the focus of attention has to shift from the traditional large-scale corporate farms to the much smaller individual farms.

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