# CHANGING STRUCTURE OF TURKISH AGRICULTURE

Charles K. Mann[1]

## Introduction

Professor Resat Aktan, whose memory is honoured by this paper, occupied a unique place in the history of Turkish agriculture--teacher, scholar, Minister of Agriculture, and long-time Turkish delegate to the IAAE. Among his many accomplishments, he led two landmark agricultural surveys which serve to chronicle the development of modern Turkish agriculture.

While Ataturk had set Turkey on the road to modernization of agriculture, the end of World War II still found Turkish wheat farming little different from what it had been centuries earlier. In 1947, for example, there were only 1,556 tractors. However, a strong government commitment to the development of agriculture and massive Marshall Plan assistance were to change this situation drastically. By 1956, over 40,000 tractors had been imported, along with associated ploughs, harrows, grain drills, and combines. Land devoted to cereals climbed rapidly from 7.6 million hectares in 1947 to 13 million hectares in 1955. While cereal production rose sharply, yields remained stagnant until the late 1960s. Since then, they have steadily risen. By 1980, Turkey had become a consistent and substantial cereal exporter. What follows is an examination of the nature of Turkey's 30-year transformation from traditional to modern commercial cereal production.

## Sources of Productivity

Following Hayami and Ruttan it is useful to divide technological change into mechanical and chemical/biological dimensions. The analysis is facilitated by Professor Aktan's two comprehensive farm level surveys, one done in the mid-1950s supported by USAID (Faculty of Political Science) and one done in the mid-1970s in collaboration with CIMMYT (Aktan).[2]

The agricultural change which occurred in the 1950s was based on a mechanical technology which provided the power needed to open new lands. The fortuitous occurrence of 2 successive years of excellent weather while thousands of tractors were introduced gave the appearance that the technology was raising yields as well as extending the area planted. However, with the passing of the exceptionally favourable weather, yields dropped back to earlier levels and, on average, remained there for another 15 years. In retrospect, it is clear that the predominant impact of the technological revolution of the 1950s was to expand greatly the area sown to cereals but not to raise yields.

Beginning in the late 1960s, a fundamentally different sort of agricultural transformation began to take place, this time based on chemical/biological technological change. The yield ceiling of traditional Turkish wheat varieties was relatively low. Yields did not respond to increased applications of fertilizer; the wheat simply grew taller and then lodged. Moreover, with weed growth unchecked, much of the additional nutrient from fertilizers was absorbed by excessive weed growth.

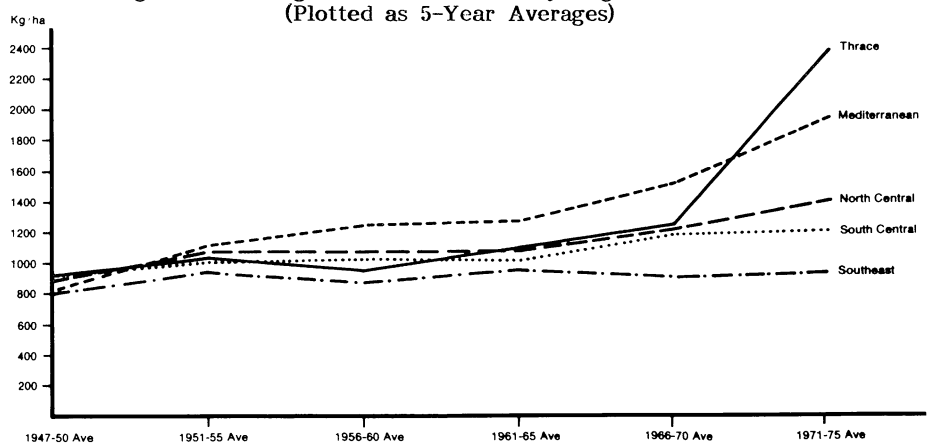
With the advent of the dwarf wheats in the late 1960s, plant types became available which could convert large doses of fertilizer into increased grain production. The heavy grain filled head was supported on a short, stiff stem which resisted lodging. At the same time, chemical means of controlling weed populations became available, allowing the farmer to ensure that the additional nutrient went into the wheat crop and not into weed growth. While wheat area has increased relatively little since the introduction of high yielding varieties, production again showed a substantial increase. However, the impact of the new

technology on yield has varied substantially by region. Figure 1 shows the yield per hectare over time broken down by region. The impact of the improved varieties and chemical inputs within the past 10 years is apparent. In the relatively high rainfall areas, where the agroclimatic conditions favoured the new high yielding varieties, yield increases have been dramatic. More recently, Central Anatolia has benefited from substantial yield increases as chemical weed control has combined with fertilizer use and improved winter wheats to push up yields. These changes underlie the high production of Turkish wheat over the past 5 years.

Looking at yield changes by region also highlights the fact that yields in southeastern Turkey have been stagnant for 25 years. In some parts of the Southeast, this is probably due to extremely low rainfall. Without soil moisture, the additional nutrients available from chemical fertilizer cannot be used by the plants. However, in other parts of the Southeast, the annual rainfall is higher than in Ankara. For example, in Ankara the annual average is 367 mm and in Dyarbakir it is 496 mm. Although the climate appears riskier, it does not seem likely that agroclimatic conditions alone have caused this stagnant yield performance.[3]

Improved high yielding varieties well suited to the region and improved cultural practices have been developed in the agricultural research station at Dyarbakir and tested throughout the region. Experimental data suggest that at least some parts of the Southeast could enjoy the same sort of dramatic yield improvement in cereals as other parts of the country.

Figure 1. Changes in Wheat Yields by Region: 1947-1975
(Plotted as 5-Year Averages)




## Size Distribution of Farms

In addition to helping understand changes in productivity, further exploration of the Aktan survey data could illuminate another important but little understood change occurring in Turkish agriculture. There is evidence of a profound shift in the size distribution of farm enterprises as distinguished from the size distribution of land ownership. Early in the period--when animal power was the predominant means of production--a large ownership unit would be farmed by several farm families each with their animal teams, since each team could only plough a relatively small area. In contrast, a tractor typically can plough at least 75 hectares per year. This means that in a fallow rotation system, one tractor can handle at least 150 hectares of farmland.

To purchase a tractor on credit, a farmer must have a certain minimum size of cropland to till. The farmer need not own it all but must have the right to farm it. This requirement of the credit system plus the financial incentive to use a tractor somewhere near its capacity means that many tractor owners are seeking other land to till. This has given rise to the common practice of ortacilik (partnership), under which a tractor owner farms someone else's land, returning to that person a share of the crop. The size of the effective farm enterprise unit bears no relationship to the amount of land owned by the tractor owner. The few studies which bear on this question suggest that many landowners are giving their land out in ortacilik to others to farm.

When one looks at the structure of ownership of land in Turkey, it appears to be a land of small farmers; much of it has always been. However, at least on the Anatolian Plateau, the structure of farm enterprises presents a much different picture. It is now an area of many commercial sized farm operations. The small landowners are collecting rent for their land but have ceased any active involvement in the cereal production which occurs on it. Table 1 illustrates this point by comparing the structure of land ownership in selected provinces with the structure of farm enterprises. The Village Inventories show the size distribution of land ownership. Erkus' study is based on a survey which focused on the size distribution of farm enterprises. While only 28 percent of the land is owned in units over 200 decares, 64 percent is operated in units over 200 decares. Similarly, only 5 percent of the owners own more than 200 decares, yet 29 percent of the farmers operate farms larger than 200 decares. About 60 percent of the farm enterprises are over 100 decares.

**Table 1. Comparison of Size Distribution of Landownership and Farm Enterprises: Central Anatolia**

| Size group (da) | Land | | Landowners | Enterprises |
|---|---|---|---|---|
| | Village Inventories | Erkus | Village Inventories | Erkus |
| | Percent | | | |
| 0-25 | 8.7 | 1.1 | 41.7 | 9.1 |
| 26-50 | 13.2 | 3.0 | 22.3 | 13.3 |
| 51-100 | 21.1 | 7.7 | 18.4 | 18.5 |
| 101-200 | 29.5 | 24.7 | 12.3 | 30.0 |
| Over 200 | 27.6 | 63.6 | 5.2 | 29.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

While there are relatively few studies by which to judge, those which are available suggest a growing discrepancy between the structure of enterprises and the structure of land ownership. Yet, most writers on Turkish agriculture still write about the structure of land ownership as if it represents the actual structure of farming. This produces a severely distorted view of what is actually taking place in Turkish agriculture. The relevant unit for the policymaker is the farm management unit, not the landownership unit. In developing and analyzing survey data, it would be helpful to maintain this focus on management units as the basis for analysis. Continuing to look at the structure of land ownership as if it represents the structure of farm enterprises blinds the policymaker to the realities of modern Turkish agriculture.

## Conclusion

As is happening in the United States, the Turkish nation should be thinking ahead to what type of agricultural structure it wishes to have by the year 2000. Policy decisions can either accelerate or slow the concentration of agriculture into relatively large scale units. Continuing to focus on the unchanging distribution in land ownership totally obscures the tendency toward concentration taking place within agriculture. A better understanding of the present structure of production would help to guide intelligent debate on the structure desired for the future. It is likely that Professor Aktan's surveys could yield considerable insight into this phenomenon of divergence between landownership structure and enterprise structure were his raw data to be analyzed from this point of view.

Professor Aktan was an extraordinary individual. As a teacher of economic policy, he shaped the views of a generation of Turkish economists and administrators. In a series of administrative tasks in agriculture, culminating in his appointment as Minister of Agriculture in 1974, he proved that he could translate his theoretical understanding of agriculture into practical and enlightened management of the sector. His contributions as a social scientist to an understanding of Turkish agriculture have been profound. His two landmark surveys capture the impact of a mechanical revolution in agricultural technology in the early 1950s and a chemical/biological revolution in the 1970s. Further analysis of his data could guide agricultural planning for the 1980s.

His wisdom, devotion to country, and his hand of friendship will be sorely missed by those whose lives he touched. As his teaching shaped the understanding of the past generation, so the understanding communicated by his important research will shape the understanding of the next generation.

## Notes

[1]Associate Director, Agricultural and Social Sciences, the Rockefeller Foundation. The author formerly served as an economist with the Rockefeller Foundation and Government of Turkey cooperative wheat project, and was a visiting professor at the Middle East Technical University. The views expressed in this paper are not necessarily those of the Rockefeller Foundation. The paper was read by Derek Byerlee.

[2]After collecting the data for the latter study, Professor Aktan was appointed Minister of Agriculture; Demir carried out an analysis of his spring wheat data while a visiting scientist at CIMMYT.

[3]The coefficient of variation in annual rainfall is greater in the Southeast. For elaboration on these points, see Mann. In addition to climate, a relatively higher degree of tenancy in the area may also limit farmer willingness to make agricultural investments.

## References

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## OPENER'S REMARKS—Ali Rahman

### Lingard and Wicks' Paper

What is meant by mechanization is not clear. Assuming that it means the introduction of tractors, it is not clear what size tractor was introduced. In order to investigate the impact of introducing tractors, I suggest that the analysis should have been based on horsepower. For example, some studies suggest that the 60 horsepower tractor merely replaces labour and does not increase cropping intensity.

The authors stated that the cropping pattern in the study areas was double cropped rice under irrigation. However, were the observed results due to mechanization or to irrigation? I believe these results were due to the availability of water and other inputs, perhaps including tractors, but certainly not due to mechanization alone. Nonetheless, the study is useful in that it documents changes in rice production, but should be continued for a longer time period, so that the rate of change over a sufficient number of years can be monitored to allow a new equilibrium of farming practices to be reached and observed.

### D'Silva and Raza's Paper

The success of the Green Revolution in achieving development goals depends not only on fertilizer distribution, but also on land reform, credit, price, fiscal, and tax policies.

Land reform is utilized not only as a direct means of improving the distribution of income, but also as a prerequisite for any rural development policy which aims to reduce income inequalities. The dispersion of land holdings in the rural sector largely influences the overall degree of inequality, and implies that redistribution of land would lead to greater income equality within the rural sector and in the economy in general. However, landownership is not the only source of income inequality; modern agriculture has to be thought of in terms both of how it contributes to the community and how it aids the individual farmer. Therefore, access to sufficient water and seeds, availability of credit, and knowledge of and access to markets are crucial factors for the success of land reform in reducing income inequalities. If assistance and complementary services are not provided to the small farms, a land reform programme may create noticeable voids in the areas of water management and credit.

In most developing countries, agricultural credit tends to flow in favour of the large farmers, and the small farmers continue to be handicapped in obtaining credit from institutional sources. These results are due to the low interest rate policies for public credit programmes. In addition, the low interest rate policies tend to reduce the demand for labour and the participation of poor people in the development process. As large farmers' profits increase, they tend to use labour saving technology. The existence of the technological gap, therefore, is largely due to credit and marketing institutions.

Agricultural price policy is a means of influencing the development and allocation of resources to society's objectives of growth and equitable distribution of income. In many developing countries, the net effect of the price policy (i.e., domestic price above the international price) is a bias against agriculture in the relative terms of trade, and a tendency to worsen both economic growth and the distribution of income.

Because modern agricultural technology requires skilled personnel, high standards of literacy, and an increase in productivity, government fiscal policy is important. For example, public health, education, and infrastructure

development are all redistributive elements of public expenditures. All of these have to be provided in order to improve the productivity and living standards of the poor.

Taxation can be used to improve the distribution of income generated by the economic system. The tax system has influenced primary (pre-tax) income distribution through policies affecting employment and the relative rewards received by labour and capital.

Thus, in order to design and implement rural development projects, we have to consider not only the distribution of fertilizers, but also other policies which could tend to equate the return to productive resources, and to take advantage of new technologies and opportunities.

## RAPPORTEUR'S REPORT—H. M. G. Herath

In discussion of Lingard and Wicks' paper, the way in which mechanization induces institutional changes, such as in farm size, was mentioned. If the method of analysis is designed to segregate the effects of mechanization from those of institutional differences, some of which are local, the effects of mechanization may not be correctly measured. In West Java, no increase in demand for tractors was observed, due to unremunerative hire charges being paid to tractor owners. However, a large increase in real wages in West Java was considered to be an indication of the need for inexpensive tractor power. Competition between draught (bullock) power and tractors means that the opportunity cost of feed needs to be taken into account when estimating the cost of draught animals. Policymakers should be made aware of the results of Lingard and Wicks' study. In reply, the authors accepted the merits of a longer term study. They also felt that no significant changes in farm size could have occurred during the study period.

D'Silva and Raza's paper showed that an alternative project which included traditional farmers performed better than the Funtua project in terms of income and welfare. The question was raised whether there was any increase in productivity in the alternative project. The Funtua project had certain recommendations for agricultural production, particularly with regard to fertilizer which was subsidized up to 90 percent. The returns, even if good, were questioned, since these could have resulted from the heavy subsidy on fertilizer. Also, the recommendations should be tested under actual as well as special project conditions. The Nigerian case also indicated a planning effort for technology per se, and no guarantee of improved productivity or distribution of income. In reply, the authors stated that the recommendations had been tested under actual farm conditions to a limited extent. Also, the emphasis on technology adoption has only recently been widened to allow for other welfare factors such as distribution, credit, and marketing facilities; this is expected to widen the spectrum of beneficiaries.

The discussion of Mann's paper centred on the various effects of tractorization on wheat production in Turkey. The substantial out migration of labour, particularly to Europe, is similar to the situation in Mexico. An increase in real wages can be expected.

Contributing to the discussion were Richard Foote, J. B. Hardaker, John Hardie, J. P. Hrabovszky, Kenneth C. Nobe (Session Chairman), V. K. Reddy, V. Steigerwald, and P. M. Villegas.