# Food Production and Agricultural Development in Afghanistan

By

John R. Borthwick

prepared for

The United States Agency for International Development

Kabul, Afghanistan
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The views expressed in this paper are the sole responsibility of the author.

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## NOTE

Crop production data in Afghanistan are at best estimates, and must be regarded with a good deal of suspicion. The best that can be done is to stay with one series. All Afghan production data used in this study are Ministry of Agriculture estimates. Other government ministries and foreign organizations produce series at odds with this one; however, this is generally felt to be the most reliable. Absolute levels may not be correct, but the series is felt to represent correctly year-to-year movements in direction if not always in magnitude. Crop areas are probably very inaccurate, and whenever possible work with these data are avoided. Livestock estimates are equally dubious. Most other data used is of fair quality; if not, specific mention is made of the fact.

In most cases, the Moslem calendar year is used, this being the reporting base for almost all economic data in Afghanistan. In case where the years go back some distance, the Christian year is given too for orientation. The years most commonly referred to are 1349-54 corresponding to the years 1970/71 - 1975/76. The Moslem year begins on March 21 of the Christian year.

Often Afghan units of measurement are referred to, again as so many variables are expressed in these units. The ones commonly used and their conversions are: 1 seer = 7.066 kg, 1 jerib = .1952 hectare, one US dollar = 57 Afs. (Sept. 1975)

Finally, numbers in parentheses that appear throughout the text refer to references at the end of the study.

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# FOOD PRODUCTION AND AGRICULTURAL DEVELOPMENT IN AFGHANISTAN

John R. Borthwick

The world is currently focusing on the problems of food production with greater concern than ever before. The immediate origins of current concern can primarily be traced to the widespread series of poor harvests in the early 1970's, and the far-reaching impact of the energy and fertilizer price increases. In 1974, for only the second time since World War II (the first had been only two years earlier), did aggregate world grain production fall, and by a substantial five percent. This is quite unusual, as poor harvests in one part of the world are usually more than offset by increases (from increased investment and technological progress) in other parts of the world. The short-run concern these developments produced has presently envolved into an awareness of the ultimately long-run nature of the problem. The complexity of the relationships that emerged as the issue was studied in all its implications made it apparent that new outlooks were needed. For the first time it was realized that in DC's and many LDC's increased production was no longer possible at negligible cost and that increasing affluence in the developed countries was as much a determinant of increase of food demand as increasing populations in the underdeveloped nations. Despite

an apparent awareness of a problem much greater in scope than just one of increasing food production, solutions are all of the production-increasing nature. As these solutions stand, they are not only superficial but also contain the potential for producing enormous adverse social and economic consequences.

I will first present a review of the general consensus of the problem and its solutions as reflected in current literature. Following this I will explore the consequences of the approaches, and then indicate the need for a broad-based development strategy to share the problem in all its implications. Finally, following this general analysis, I will examine the specific nature of the food production problem in Afghanistan and make suggestions for its solution.

## An Informal Review of the Literature on the World Food Problem

World food production seems to divide into three distinct time horizons. The first is the issue of short-run food security, the ability of the world to compensate for short-run year to year shortfalls in production. But it is in the medium- to long-run that the issues are the most crucial, for past trends in consumption and production are unlikely to change in the short-run, and the economic developments of the past few years are likely to remain underlying determinants for some time to come.

The World Food Conference of November 1974 achieved considerable success in the short-run aspects of the problem. The establishment of a worldwide grain reserve system will help buffer local temporary short-falls in production, as will increased food from the surplus developed nations to deficit, developing nations. In the longer run, fundamental social, economic and political changes will have to take place if the world is not to run out of food. The coming decades, however, are the crucial ones, for it is in this time horizon that we can both satisfy the needs and the same time change the patterns of production and consumption. It is only through tackling the problem in this time frame that we can hope to solve the ultimate food problems. It is to such literature that I will devote the remainder of this review.

In terms of aggregate production, the developed and developing regions of the world have demonstrated almost equal increases in production over the last two decades. In both regions, 1973 food production had increased by almost 30% over the levels of the early 1960's, and more than 50% over the level of the mid-1950s (1, p 515). And from a global perspective, food production has held its own against population growth, as the following table shows:

World Per Capita Food Production 1956-67 (1957-59=100)

| | World | LDCs | DCs |
|---|---|---|---|
| 1956 | 100 | 99 | 98 |
| 1962 | 103 | 101 | 105 |
| 1967 | 107 | 104 | 117 |
| 1973 | - | 105 | 118 |

Sources: The World Food Problem - A Guardedly Optimistic Approach, p. 26 and USAID, Economic Growth Trends for Near East and South Asia 1976, p. 10.

However, while per capita production has increased at an average 1-5% annually in the developed countries, production increases have been all but eclipsed by population growth in the developing countries. Consequently the corresponding rate in the developing countries is a low 1/2%, or about 1/3 that of the developed countries (1, p. 516). Total demand in LDCs is increasing at an annual rate of 3.5%, which on a per capita basis is a rate of about 1%, or twice as fast as production. Developing countries must thus import ever-increasing amounts of food. The USDA and FAO have both estimated that the 16-20 million tons imported in the 1969-71 period will expand to 70-85 million tons by 1985, given current trends (3, A 75).

While the trends that have caused the grain-rich countries of the world,

the United States in particular, to become net suppliers to the rest of the world will continue, it is doubtful whether the developing countries will continue to be able to afford importing their food production deficits. Now that the idle U.S. cropland has been brought into production, further production increases can only come about at significantly increased cost. Food production is generally a capital intensive enterprise in the developed countries and yields are high; but to further increase yields and production, ever-increasing amounts of resources will have to be applied to obtain a constant increase in yield. This increased capital thus loses the high efficiency inherent in low application and substantial price increases will necessarily result. Unfortunately, these price increases that increased production must imply are beyond the means of the poorest, most populous countries, who would be the primary users of this increased production.

This simple supply-side analysis leads to one immediate conclusion. The developing nations are going to have to rely increasingly upon themselves to cover their future needs. They themselves constitute the last great possibilities for increased food production at relatively low cost. Although the possibilities for increasing the area under cultivation are quite limited, enormous gains in productivity are to be had from the application of improved cultivation practices and modern technology, as the following two examples illustrate. India produces 110 million tons of grain on some 350 million acres of cropland, while the U.S.,

under similar climatic conditions and comparable area, produces almost 250 millions tons (3, p 75). Similarly it has been estimated that additional fertilizer would increase yields by twice as much in India as it would in the U.S. as a result of the former's relatively low and the latter's relatively high present rates of application (3, p 76). The "Green Revolution" that swept through much of the developing world illustrated vividly the potential of the developing world. For example, wheat production in India increased from 11 to 26 million tons within 7 years (although it must be said not all the increase was attributable to fertilizer, irrigation and improved seeds; for the area under cultivation also increased, at the expense of other crops) (3, p. 76). However, the developments of the last three or four years have suddenly made us aware of the limitations of the Green Revolution, and have had a significantly sobering effect on the belief that the world food problem will easily disappear.*

As the prospects for increasing food supplies without substantial increases in real cost become more and more remote, it has become increasingly important to reduce the growth in demand for food. While for years it had been advocated that the developing countries (who had the food deficits) curb their birth rates, there was little imperative in the issue as long as food could easily be obtained.

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* These problems include increases in the numbers of truly landless agricultural laborors, rural, urban migration, more concentrated land ownership patterns and increased polarization of classes and social conflict.

But the days of easy food are gone, and the increasing pressure population growth brings to bear on food supplies must be relieved. Simple analyses show that simply maintaining per capita consumption levels at their current levels with population growth of 2% per annum requires doubling food production in one generation.

The current problem of food production on a global scale is not as severe as the previous statistics would indicate. Consumption is disproportionaly skewed between the developed and developing nations. The growth rates themselves become meaningless unless one realizes the respective levels to which each of the growth rates apply. The following table comparing per capita consumption of certain major food commodities in developed and developing countries helps put the issue in proper perspective.

Average Annual Per Capita Direct Consumption of Selected Food Commodities in 1970 (in Kg)

| Commodity | DCs | LDCs |
|---|---|---|
| Cereals | 96.8 | 129.3 |
| Starchy Roots | 71.6 | 63.9 |
| Pulses, Nuts | 5.5 | 15.4 |
| Meats | 66.5 | 11.4 |
| Fish | 21.5 | 6.9 |
| Dairy Products | 108.2 | 38.8 |
| Fruit and Vegetables | 178.3 | 71.9 |
| Vegetable Oil | 11.1 | 4.1 |
| Animal Fats | 4.5 | .4 |
| Sugar | 37.7 | 19.4 |

Source: The U.S. and World Development: Agenda for Action 1975, Table A-7 p. 208.

In almost every category except starches (cereals, roots, nuts) do the developing countries enjoy a substantial edge in per capita consumption. This is particularly blatant in the case of high quality protein (dairy products, meat, fish) although even in terms of total protein consumption, the developed countries (which contain 1/4 of the world's population) consume 3/4 of its protein. Moreover, the apparent advantage of the developing countries in cereals consumption is illusory. The above tale reflects only direct consumption, and thus neglects the indirect consumption (through livestock, poultry, etc.) that constitutes the major portion of total developed-world cereal consumption. Taking both direct and indirect consumption into account completely reverses the previous pattern of per capita cereal consumption.

Average Annual Per Capita Cereal Consumption (Direct & Indirect) in Kg.

| | 1964-66 | 1972-74 | Percentage Increase (Average Annual) |
|---|---|---|---|
| U.S. | 726 | 839 | 1.9% |
| USSR | 301 | 651 | 3.3% |
| EEC | 408 | 542 | 1.3% |
| Japan | 240 | 281 | 2.0% |
| China | 190 | 195 | .2% |
| Developing Countries | 168 | 179 | .8% |

Source: The U.S. and World Development: Agenda for Action 1975, Table A-8, p. 209

The two tables together illustrate the enormous disparity between the actual per capita consumption in the two regions. While the distribution is inequitable, self-interest and pragmatism ensure that no major redistribution will occur. The existing distribution of food must be taken as given, despite the fact the developed world feeds its livestock as much grain as the remaining two billion people consume directly. The alarming thing is that the gap is widening. In the developed world, per capita consumption is increasing at least twice as fast as in the developing world. Although recent evidence seems to indicate a reversal of the cereal consumption trend, with livestock being increasely range-fed and correspondingly less grain-fed, whether this trend is merely a short-term phenomenon resulting from current (1974-5) market conditions or a fundamental change remains to be seen. The constant trend towards the improvement of diets through the increased consumption of high-quality protein that accompanies growth in incomes would nevertheless seem to indicate that the demand for grain to provide for animal feeds is going to continue to grow on a world-wide basis. This despite recent indications that the developed nations should decrease and not increase their consumption of fat-rich meats in favor of leaner varieties and direct consumption of grains. A nation wide campaign in this direction in Norway showed that not only were health and life expectancies improved, but the agricultural deficit was significantly

reduced as well. As over-consumption is as unhealthy as under-consumption, developed countries should be strongly motivated to consume less than they do and make the surplus available to those countries that really need it, at tolerable cost.

The grounds for a world food shortage lie in increased demand throughout the world; aggregate demand has been growing at about 3 percent annually in the developed world and about 3.5 percent annually in the developing world. While, income growth has thus become an equally important determinant as population, the ultimate responsibility must still lie in decreasing population growth, for the income effects are inexorable while population growth can be curbed.* Moreover it is in the countries where population is growing rapidly that the food deficits exist, not the wealthy ones in which the large income effects show.

The events of 1972-74, although they took place in a complex framework of political, economic, meteorological and agronomic developments, are symptomatic of the same basic problem, viz, the world food problem is not being solved. In developing countries where the demand for food is still relatively elastic, increased production has gone into current domestic consumption, with the consequence that in years of poor harvest there are no reserve stocks to mitigate the effects of production short-falls on consumption. As we cannot rely

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* Unless more countries follow Norway's consumption-decreasing lead.

upon good harvests to occur on an annual basis, we cannot say developing countries are achieving self-sufficiency until they have proven it over a period of good and poor harvests without undue hardship. Perhaps the most conclusive evidence that the world's food problem is not being solved, given consumption patterns as they are and most likely to remain, is seen in the following table.

Indicators of World Food Security 1961-74 (Millions of tons)

| | Reserve Stocks of Grains | Grain Equivalent of Idled U.S. Cropland | Total Reserves | Reserves as part of Annual Grain Consumption (Percent) | (Days) |
|---|---|---|---|---|---|
| 1961 | 154 | 68 | 222 | 26 | 95 |
| 1962 | 131 | 81 | 212 | 24 | 88 |
| 1963 | 125 | 70 | 195 | 21 | 77 |
| 1964 | 128 | 70 | 198 | 21 | 77 |
| 1965 | 113 | 71 | 184 | 19 | 69 |
| 1966 | 99 | 79 | 178 | 18 | 66 |
| 1967 | 100 | 51 | 151 | 15 | 55 |
| 1968 | 116 | 61 | 177 | 17 | 62 |
| 1969 | 136 | 73 | 209 | 19 | 69 |
| 1970 | 146 | 71 | 217 | 19 | 69 |
| 1971 | 120 | 41 | 161 | 14 | 51 |
| 1972 | 131 | 78 | 209 | 18 | 66 |
| 1973 | 106 | 24 | 130 | 11 | 40 |
| 1974 | 90 | 0 | 90 | 7 | 26 |

Source: Same as preceding, Table C-7, p. 244.

Reserves in 1975 are expected to fall even lower as a result of the poor 1974 harvest, perhaps as low as 8 days. Total reserves are on a slow but noticeable downward trend over the 14-year period. Clearly, at the global level, consumption is outstripping production.

The immediate cause of the current crisis is the series of bad agricultural harvests (although fish catches have been down for the past 3 years too, after a decade of continuous growth (3, p.74) compounded by the effects of the energy crisis and fertilizer shortages. In 1972, massive gain purchases, by the Soviet Union in particular (1/5 of the US wheat crop), drained grain reserves at a time when they stood at adequate levels. Several years of good harvests were then necessary to rebuild reserves to their old levels. And while 1973 was a good harvest year, 1974 produced another shortfall, even greater than that of 1972. But this time, world grain reserves were still precariously low; thus there will probably be a consumption shortfall as well. Economic power will ensure that it will not be the wealthy countries in which consumption falls, but rather those poor countries that already underconsume.

The causes of the shortfall were by no means restricted to weather alone. The shortage and increased prices of fertilizer and energy have not only raised the costs of production but resulted in outright reduction in production. In India, for instance, the USDA has estimated that the wheat crop fell by 1 million tons or

4 percent solely as a result of the lack of fuel for operating irrigation pumps (3, p. 73). The greatly increased prices of fertilizer also resulted in reductions in application especially in developing countries.

The combined effects of these two phenomena have hit the world's poorest countries hardest, just as many were showing the first signs of self-sufficiency. The combined effects of the vast increases in food, energy, and fertilizer prices have had such severe impact on some LDC's, particularly their balance of payments, that a new category of LDC's has had to be distinguished - the Fourth World. For these, already the world's poorest nations, the situation borders on the desperate. The concessionary food aid of which these nations were major recipients has been greatly reduced -- total PL 480 shipments from the U.S. dropped from $1,107 million in 1972 to $760 million in 1974 (3, Table C-9, p. 24 T). And given that the food surpluses that originally motivated the program have disappeared, it is unlikely the program will be resumed in its previous form. In addition, fuel energy costs have quadrupled since 1973 and fourth world countries are almost exclusively large net importers of petroleum. And finally fertilizer costs have in some cases increased five fold. As a typical example of how these factors affect the poorest countries, take the case of India. From 1973 to 1974, her imports of fertilizer jumped from $205 to $405 million, her imports of petroleum from $447 to $1,300 million, and her imports of food

grain from $455 to $1,000 million. In 1974 India's balance of payments deficit amounted to 16.8 percent of total imports, despite imports of these commodities already having been cut to the bone, and there are countries more seriously affected than India.

The implications of these recent developments serve only to reinforce those of the longer-run trends: it is imperative the developing countries become increasingly self-sufficient in food production, and they must focus a significantly greater portion of their development resources towards that end than they have in the past. The world fertilizer shortage will probably be only temporary as world-wide production responds to increased prices.* The developing countries themselves can contribute significantly to the solution of the problem, for many of their chemical fertilizer plants have been estimated to be running at 2/3 capacity, and organic fertilizers have to be fully utilized in these nations (3, p 85). The distribution of fertilizer is, as with food, not without its more bizarre aspects; more fertilizer is used on lawns, cemeteries and golf courses in the U.S. (15 percent of total)

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* In the longer run, other sources of fertilization will have to be found. The sources of fertilizers (natural gas, phosphates, etc.) are limited and in the long run are likely to be scarce and expenses. More attention should be given to conservation by using lower application rates over broader base.

than is used in all of India for food production (3, p. 84). With regard to the energy problem, those countries that do not have domestic production potential will be primarily at the mercy of OPEC to provide them energy at lower rates, or dependent upon their continuing ability to borrow from international organizations to meet their needs.

The Dilemma of Increased Food Production

The preceding discussion gives a fairly comprehensive review of the literature, of the perceived nature of the food production problem and the direction thought is turning regarding a solution. If the world food crisis has produced a conventional wisdom, then it is probably this. While discussion of the problem is generally quite sophisticated and realizes the inter-connected nature of the problem, the nature of the proposed solutions is alarmingly naive. The all-pervading concern with the shortage of food so blinds the analysis that sight of the accompanying institutional problems is lost. Academic concern for institutional issues never goes beyond that, and the resulting proposals are lopsided and superficial, and amount to little more than increasing food production through increased application of modern technology. As I will show, it is not only doubtful whether such a short-sighted attack can produce more food on its own, but is likely to produce dire social consequences as well.

The literature almost unfailingly reflects the belief that the world food problem is a supply-side problem -- enough food cannot be produced. There is a crucial failure to fully appreciate the demand side of the problem. To the extent that it is, the prepossession with the inequitably large and increasing demand for food by the developed countries has completely detracted attention from the real problem of demand, that of insufficient economic demand for food by the countries of the developing world. This problem is of at least equally important concern as that of food supplies and, as I shall show, inextricably linked to it. In order to fully explore the implications of the preceeding, it will be necessary to treat the analysis in more specific economic terms.*

We assume the following:

1) there exists some nutritional need $Q^*$, below which human health deteriorates.

2) there exists a downward-sloping aggregate demand function for food, DD.

3) there exists an upward-sloping aggregate supply function for food, SS.

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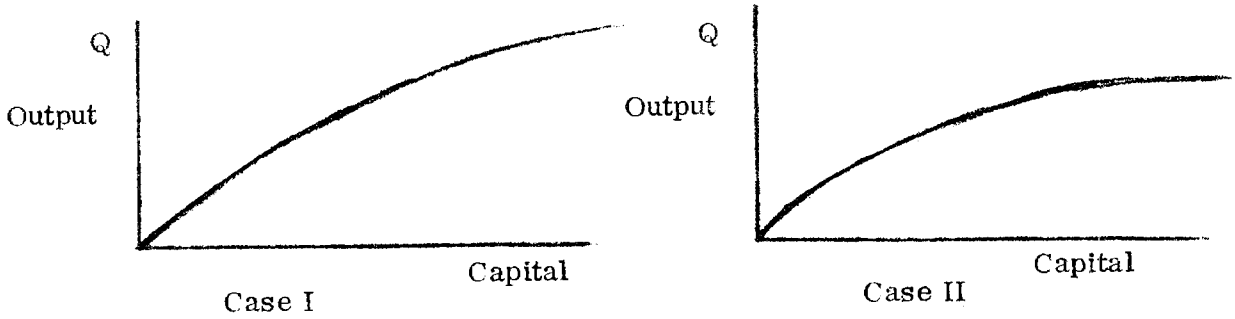
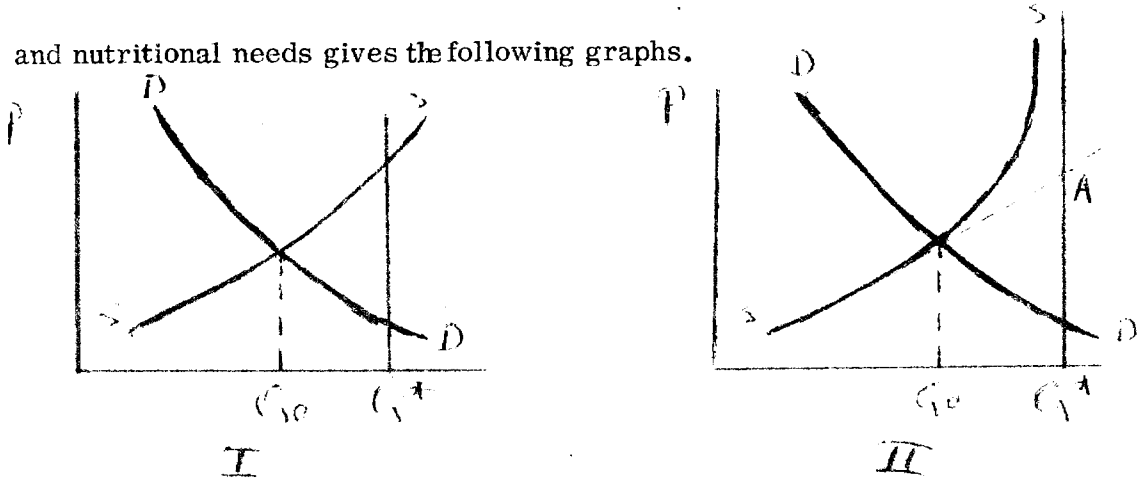
* It must be mentioned that many heroic assumptions regarding markets, price, and incomes were made but not explicity mentioned. This was in an attempt to keep analysis simple, and focus on a few main results, which are not qualitatively changed by the assumptions.

The exact nature of the supply function is critical, so I will identify two different possibilities. The two aggregate production functions from which the supply functions derive are shown below.




Here capital is any or all non-labor inputs (land, seeds, water, fertilizer, knowledge). Labor supplies are assumed to impose no constraint.

Case I is a conventional production function, more capital inputs result in more but ever-decreasing additions to output. Case II is a case in which there exist one or more bottlenecks to production, be it because of unavailability of other inputs, or lack of knowledge. Hence there is a level of production that cannot be exceeded because of certain bottlenecks. These two functions may be the same up to some point, but in the relevant range they are different. Transforming these two production functions into aggregate supply functions (the slope of the production function is the inverse of the relative price), and superimposing them on the same graph as the demand functions and nutritional needs gives the following graphs.



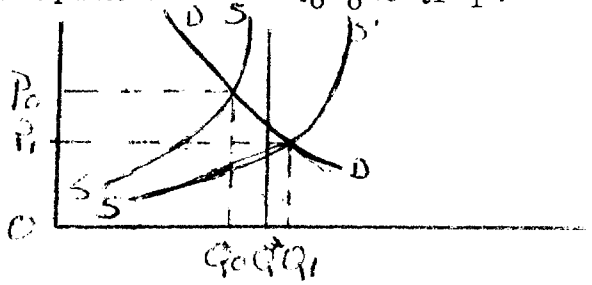
Although similar, the underlying assumptions make the two graphs behaviorally quite different. In case II, production can never reach $Q^*$ because of unavailable inputs. Hence, no matter what the demand for food, production (B) will never be sufficient to satisfy nutritional needs $Q^*$. If the supply curve did not become essentially vertical but rather followed the dashed line then production and demand could intersect at a point that satisfies nutritional needs, A. This appears to be the model politicians and economists have in mind when they talk of shortages, there is insufficient production, but adequate demand (although they never explicitly say so). The call is thus for increased fertilizers, "miracle" seeds and adequate energy and water supplies. If this were indeed the problem, at least the short-run solution would appear relatively straightforward.

Unfortunately, the problem does not appear that straightforward. Fertilizers, "miracle" seeds and irrigation facilities have produced enormous increases in food production, increases that were once felt would lead to self-sufficiency. However, despite these enormous increases in production, the "shortage" of food will not disappear, if as an indication of the shortage we take the enormous number of inadequately nourished and starving people, whose ranks have not shrunk. This behavior would appear to fit into case I. Here

economic supply and demand again interesect at a point short of $Q^*$, indicating a food shortage. The difference is, however, that it is quite feasible to supply amount $Q^*$ if there were a demand for it. As matters stand, there is insufficient economic demand to induce production at or above the nutritional needs level of $Q^*$. Were producers to increase production to $Q^*$, they would find they couldn't sell at cost covering P1. For the markets to clear, the price would have to fall to P2, and producers would lose. Thus, the forces of supply and demand push production towards $Q_o$.

There appear to be two possible scenarios, but only one advocated solution. This solution is to increase production by shifting the production function outwards through capital-intensive methods that raise the output per man and thus lower the cost. This solution is unsatisfactory, regardless of the initial conditions-model I or model II. It is rather enlightening to investigate each case in considerable detail and follow it through to its logical conclusion.

First, supposing for case II there is a shift in the production function and production increases. More can be produced at the original price, or the original amount costs less to produce and can be sold for less. The supply curve thus shifts to $S^1S^1$, and equilibrium from $Q_oP_o$ to $Q_1P_1$.



The problem is apparently solved. People now consume more than $Q^*$, and no food shortage exists. Who has benefited from the increased production? Clearly society as a whole has. Consumer surplus has increased by area $P_oP_1$ BE, while it has only cost additional resources $AQ_oQ_1E$ less what was saved by shifting the supply function (area between 3 and $S^1$ up to $Q_o$). Furthermore no food shortage now exists (in aggregate terms).

It becomes obvious that consumers have benefited at the expense of the producers. The consumers now consume more at a lower price, so they are certainly better off. The producers, however, have suffered.* As the elasticity of demand for food is less than one (an empirically determined fact), their income has actually fallen, the price obtained for their produce has dropped more percentage-wise than the quantity sold has increased. In graphical terms, this means area $OP_oBQ_o$, income obtained prior to increasing production, is larger than $OP_1EQ_1$, the post-increase income.

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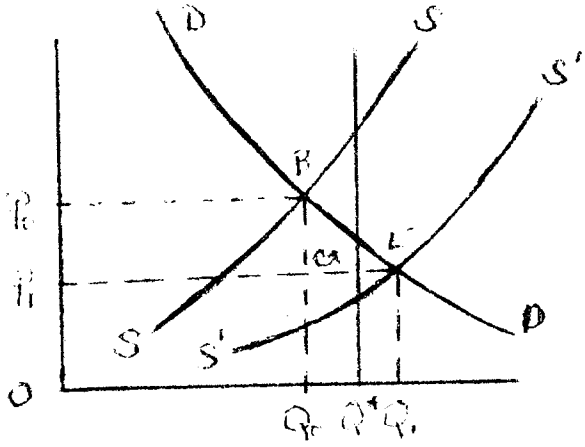
* The empirical cases for both net and gross income are presented later in this paper.

Case I gives very similar results. Here the supply function is again shifted out to the point at which economic demand is sufficient to cover nutritional needs.




Again, the market-clearing price has fallen; consumers have more food at lower price, in excess of nutritonal needs and society as a whole has gained. And again farm revenues have fallen, from $OP_0B_0$ to $OP_1EQ_1$. It must at this point again be emphasized that the crucial factor that prevents both consumers and producers being made better off by increasing the supply of food is the relatively price inelastic demand for food. In even the poorest countries, it has not been estimated at less than - .9 (-1.0 would leave producers' incomes unchanged).

In scenario II the result of poorer farmers is inevitable; it is truly a case of inadequate production. In the social interest then, farmers might perhaps have to be given a subsidy to guarantee sufficient production. In scenario I failure to recognize the true nature of the problem has resulted in poorer farmers. The result in either case is poorer farmers and wealthier consumers,

who now have to spend less on food then they did before. In this sense, such a policy if it could be sustained (farmers might soon realize their lesser incomes and cut production), would result in a transfer of real income and purchasing power from the rural producers to the urban consumer. In the preceding graphs this amount would be the area $P_1P_o$ BG minus $Q_oQ_1$EG.

The social consequences of such misdirected policy could be profound. Only the larger farmers who could afford to economize through economies of scale and adopt modern yield-increasing technology could operate at an increased profit.* The small farmer's output has not increased as the technology is usually unprofitable or inaccessable to him, but the price has fallen, and hence his income drops. Others may have purchased expensive inputs to increase their production, only to find their final revenue still drops, as they have failed to increase production by an amount to offset the lower price. On top of this he must repay the loans he more often than not has taken out on the inputs. Too often, he cannot afford to repay these loans, and loses his land. Wealthier farmers buy this land up, take advantage of further economies of scale, and drive still more farmers off their land. The final result is even more inequitable than before; the urban regions are wealthier than the rural, and the wealthier farmers have got wealthier at the expense of the poorer ones. In the highest level of generality, the rich have got richer, and the poor poorer.

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* This is exactly the pattern agricultural expansion followed in the U.S.

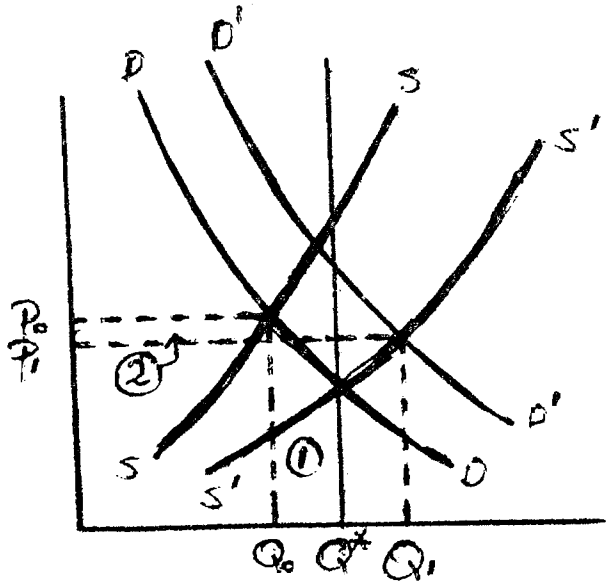
This still leaves two questions unanswered. First, the question must be asked whether it is possible to significantly shift the supply function on its own at all. As shown before, shifting the supply-function out makes farmers as a group worse off. This being the case they might never accept such technology (or be able to obtain it if they so wished). Perhaps it not as suprising as first seems, that technological change and agricultural reform occur so slowly in the poorest developing nation.

Finally, assuming the supply curve can be shifted, which of the two cases is the applicable one. The answer is difficult, and probably depends upon the country. More often than not case I, that of inadequate demand, appears to be at least part of cause, particularly in the populous, poor Fourth World. Nevertheless the actual model, if indeed either of these applies, is irrelevant. All that is relevant, and which is sufficient to support these conclusions is that the price demand for food is inelastic. This if supply is increased without any concomitant increase in demand, at least as great as the increase in supply, the end result is poorer farmers. In the poorest countries this can come about easily, in the general course of development. It is now time to look at the development process that is requisite for this process.

Development Strategy and Food Production

As just mentioned, if food production increases are not to be accompanied by poorer farmers then development strategy will have take a broad comprehensive approach, on the one hand increasing food production so that increased

food is avialable at a price at which farmers as a whole are at least as well off as they were previously, and consumers can consume the nutritional requirements. Using the same graphical analysis as before, supply and demand are now both increased.




Consumers are now clearly better off. Not only is the nutritional standard satisfied, but their consumer surplus has increased substantially. Producers are also better off. As long as rectangle 1 is larger in area than rectangle 2 then producers' incomes have also risen. The exact mathematics of this will be introduced later, but it is obvious that if demand increases sufficiently with supply increases, then both consumers and producers and hence society as a whole are better off.

The exact nature of the growth in aggregate demand is important. If average per capita incomes rise primarily because the incomes of the rich are rising, there will be little increased demand for food. They will have already satisfied their food needs and will not consume more if their incomes rise. If,

on the other hand, the incomes of the poorest rise, then their demand for food will rise significantly. These people spend the bulk of their increased incomes on food. To put these phenomena in terms of income elasticities of demand, it is estimated the income elasticity of demand is about 0.8 for countries where the average annual per capita income is less than $100, dropping to 0.6 where incomes are in the $500 range and down to zero if the income is $2,000 or greater (41 p. 19).

Improving the distribution of income, while having immense social benefits in itself, also forms the basis for increased food production that will both enable nutritional needs to be satisfied through economic demand, and allow the farmers to become better off in the process. It was once felt that there was a trade-off between growth and income distribution, a trade off that now appears very small. The notion of large farms being subject to increasing returns to scale and thus higher yields now appears equally dubious. In fact, evidence seems to indicate that in the labor-abundant developing world, yields increase with diminishing farm size(5, pp, 59, 65). Equally significant is the influence of capital intensification of agriculture in developing countries. Countries that have followed broad-participation small-farm strategies, have demonstrated greater production increases over the long run than have those nations that have placed emphasis on capital intensive, "miracle seed" agriculture (3, p. 100). In

the light of the world food problem, it would appear that the small farm, labor-intensive, capital-augmented path to agricultural development is the one to follow. Not only is increased food production promised, the need for productive employment satisfied, the rural-urban migration curbed, but also the welfare of the rural society improved (with perhaps an accompanying fall in birth rates). These are things the small industrial and services sectors cannot yet do on a large scale in developing countries. The rural development aspect of the general society-wide pattern of broad participation would entail land reform, access of farmers to necessary agricultuural inputs, improvement of the physical rural environment, and a program of health and educational improvement (7, p.173).

In many ways, the food and economic development problems appear to be one and the same thing. Solving the latter will go a long way to solving the former. The authors of the book Development Reconsidered feel it is these countries that have followed programs of broad participation that will cope with the problem associate. Current development programs reflect this attitude too. Mr. Parker of USAID recently spoke of the "... current reorientation of our bilateral assistance program to concentrate more directly on basic human problems including, food and nutrition, population growth and basic health services, education and basic health services, education and human resources development," and how world peace and stability depended upon accelerating the social as well as economic development of the poor countries (6).

The preceeding analysis has been kept to a high level of generality. While such analysis is most useful in determining and emphasizing general concepts, the unfortunate necessity to generalize conceals much of the important smaller detail. In the final analysis, every country is in ways unique. The population, economic, and socio-political form a matrix so complex that a simple extrapolation from such rudimentary analysis would be not only unreliable, but irresponsible. This paper is an attempt to analyze food production and agricultural development in Afghanistan in the context of the preceding discussion. Analysis will remain at an analytical level as far as the data are available. Institutional constraints and policies will be emphasized. In general terms, the paper will divide up as follows:

a) Identification of the food production problems and constraints

b) What is being done to increase food production, and what are its effects.

c) What should be done for a viable, equitable program to satisfy both food needs and the need for economic development.

# PART I

## The Nature of Afghanistan's Food Production Problems

Before investigating the problems agriculture faces in Afghanistan, it is important to realize the importance of this sector. Being so large in this small economy, it not only forms the basis of the current economy, but the basis upon which development must build.

## The Role of Agriculture

The agricultural sector of the Afghan economy is of all pervading importance. Not only does it provide the nation with most of its food, but also forms the direct livelihood of at least 75 percent of the population, constitutes some 50 percent of the GDP, provides about 95 percent of the locally-purchased raw material inputs to domestic industry, and earns some 75 percent of all export earnings. Consequently, the performance of the agricultural sector is of magnified importance to the performance of the economy as a whole, with swings in agricultural production resulting in large swings in general economic activity. A recent IBRD report estimates that real GDP increased 8 percent from the poor harvest year of 1350 (1971/72) to the good one of 1351 (1972/73), almost entirely the result of the 12 percent increase in agricultural output (8, p. 9). The authors of the same report believe that the drought years of 1349-50 were both accompanied by drops in real GDP. The

impact of agricultural production is further amplified through movements in food prices which determine some 90 percent the national price index, and play a major role in determining the whole wage-price structure.

The large swings in economic indicators that result from this lack of diversification hardly foster a climate conducive to investment and rapid, sustained, broad-based growth. Rather, economic growth occurs in fits and starts (as the above IBRD figures bear out); and in the long run will be slower. A poor harvest means a shortage of food. This shortage of food can be compensated for in two ways, both only second best solutions that distract government effort and private attention away from long-run development priorities. The government can either import wheat to eliminate the deficit, or it can allow the price mechanism to distribute the available supplies, the latter hurting all consumers, though the poor the hardest. Importing wheat is not only a drain on foreign exchange earnings, particularly at a time when export earnings are likely to be down, but is also subject to the vagaries of world prices and availability. The only solution that remains is to increase agricultural production to the point of self-sufficiency though a series of appropriate government development strategies and agricultural policies.

Agricultural improvement not only forms the basis of the present day economy, but also holds the key to its growth. Traditionally, sustained growth

was felt to originate from two sources: the export and/or industrial sectors. Agricultural production for domestic consumption could not in itself induce lasting growth; unilaterally increased production would be accompanied by price falls, and the demand for food being price inelastic, producers will see their incomes drops. It is possible though that this process would allow the non-agricultural sector to increase its savings and in this way promote industrial growth.

The demand for exports on the other hand can be quite elastic; provided the country is a small supplier of the products in question, it can supply all it wants without depressing the price. This being the case, the export sector grows rapidly, and the benefits spread through the rest of the economy by the multiplier process. Unfortunately, many countries found the demand for their primary products was relatively price and income inelastic, the increased supply of exports caused export prices to fall.

The strategy that most nations then thought they were forced to follow was that of industrialization, the creation of import-substituting industries. Theoretically the process is viable; the demand for industrial manufactured goods tends to be quite income elastic and demand for them grows at an increasing rate as real income grows. In this case, industrialization should be a self-sustaining process, with increased industrialization and the demand for industrial products fueling one another. Again multiplier effects would ensure that development was a broad-based process.

Traditional agriculture was to play a passive role but would benefit from the above processes in two ways. First, by reducing the supply of surplus, underemployed labor that was assumed to exist, the average product of the remaining laborers would rise. Secondly, increased demand for agricultural products that accompanied increasing urban incomes would increase rural incomes.

Nowhere has industrialization been an unqualified success, and the case of Afghanistan is typical. After initial industrialization undertaken by the private sector in the 1930's, investment stagnated. Then in the 1950's, Afghanistan embarked on a program of industrial investment by the public sector. What happened was predictable, behind tariff barriers that kept out competition and run by civil servants more interested in political survival than efficient and profitable operation, industry failed miserably. Most ran at less than, and frequently no more than 30-40 percent of, capacity and more often than not processing imported raw materials with imported capital (9, p.53 and 21). The promulgation of a new investment law that favored private enterprise did not noticeably improve matters.

All the large-scale industrialization that took place was of a capital intensive nature. Rather than ease employment problems it tended to exacerbate them. The concentration of industry in urban centers, particularly Kabul, resulted in an increased inflow from rural to urban areas faster than industry could absorb, as people chased the few high-paying industrial jobs. While the population of Afghanistan is increasing at some

2.2 percent annually, the urban population is growing at 4.5 percent while that of Kabul at some 6 percent per annum. The rural population is growing at 2.0 percent annually. (8, Table 1.2)

Nor have the multiplier effects materialized. While agriculture has benefited directly in the cases of industries that process agriculture products, the fragmented and subsistence nature of the economy have prevented the small/multiplier effects that should be, from really materializing. The major constraint on industry's role in Afghanistan is its size. Although its share in GDP doubled in the 1960's (1340's), mining and manufacturing still only constitute some 5 percent of the GDP; and as the following table shows, an even smaller percentage of the labor force.

Labor Force in 1352

| | Millions | % of Total | (1350-52) Rate of Growth |
|---|---|---|---|
| Agriculture | 3.2 | 62 | 2.5 |
| Handicrafts | .3 | 6 | 5.5 |
| Manufacturing | .09 | 2 | 6.3 |
| Services | .38 | 7 | 4.3 |
| Construction & Mining | .12 | 2 | 4.5 |
| Unallocated | .68 | 13 | 2.3 |
| Unemployed | .38 | 7 | -1.3 |
| TOTAL | 5.15 | 100 | |

Source: Central Statistics Office

Even at the current rate of growth, it will take decades before industry comprises a sector anywhere near as large as agriculture, either in terms of share of GDP or employment. Similarly, multiplier ("trickle down") effects will be small and late in coming.

All this means the following: if per capita income is to increase on a significant widespread basis, it is going to have to be through agriculture. Over 85 percent of the population is rural, and if growth and development are to be meaningful, the rural population will have to participate in the process. Industry cannot provide the basis for this, so it must be agriculture. However, even with agriculture, care must be taken. If agricultural production for domestic consumption is forced beyond the growth in demand, then agricultural development in this form will harm the rural farmers. The key to agricultural development is to increase production of foods to the level of needs and concentrate upon agricultural production for industry and export. Only if development strategy aims in this direction can the rural-urban income gap be contained, net migration to the cities be held in check, and the whole of the population benefit from development.

The Problems of Food Production

It is not easy to differentate between the symptoms and the underlying causes. A myriad of factors appear to be at work, many of which are in extricably linked with Afghanistan's overall state of underdevelopment. The

solution of many agricultural problems may not be therefore so much one of specifically directed agricultural policies as it is one of general economic development. Nevertheless several large impediments remain, some of natural, others of institutional nature than can be individually identified as being either manifestitations of the food problem or aspects of the problem. The food production problem thus takes on a varied composition. Those major aspects that will be addressed specifically in this section are 1) the weather induced variations in year-to-year output; 2) insufficient production for domestic needs; 3) dependence upon imports; 4) subsistence nature of the agriculture; and 5) problems of infrastructure and marketing.

## LAND AND CLIMATIC CONSTRAINTS

Relative to its size, Afghanistan has a relatively small population. Nevertheless, the geography and climate impose harsh constraints on the country's ability to produce food. Of a total land area of 63 million hectares (250,000 sq. miles), only a small percentage is arable, as the following breakdown shows:

| | |
|---|---|
| Pasture | 40 million ha |
| Forests | 2 million ha |
| Arable | 8 million ha |
| Other | 13 million ha |

Source: World Bank Agricultural Sector Survey, 1974.

Only 4.8 of the 8 million arable hectares is cultivated in any given year. The remainder cannot be cultivated for lack of water, and remains fallow. Of the cultivated area, 2.6 is irrigated from rivers, karezes, and springs while the remaining 2.2 million hectares are rain-fed. Three quarters of all the arable land lies north of the Hindu Kush, as does most of the rain-fed land. About 0.5 million ha of irrigated lands are double cropped, raising the effective utilization to 70 percent (9, p. 2). Double cropping is possible only in the North and South.

Soil quality in general ranges from excellent in the rich river valleys and foothills, to good on the northern plains, to poor in the desert regions in the South and South west. Much of the soil, particularly in the South and Southwest, is of high salinity, and the soil in general is of low organic content and thus requires fertilization. The mountainous character of the country is also an important determinant in agricultural production. In the low-lying regions several crops a year can be grown, while above 8,000 ft (and large region of several provinces lie above this altitude), only one crop a year of limited variety can be grown. The all-important factor to production, though, is water. Only where there is water are there settlements and agriculture.

Domestic Cereal Production

As the following rough breakdown of agricultural land shows, at least three-fifths of all cultivated land is devoted to the production of cereals.

| | |
|---|---|
| Arable land | 8.0 million ha |
| of which cultivated | 4.8 million ha |
| of which used for cereals | 3.4 million ha |
| of which irrigated | 2.0 million ha |
| dry farmed | 1.4 million ha |

This reflects the crucial role cereals play in Afghanistan. They are the mainstay of the Afghan diet, and carry a weight of 58.1 percent in the national price index. Cereal production, and wheat production in particular, along with supporting marketing and distributing businesses, is the center of Afghan economic life. The breakdown of the cereals total into its four constituents for the years 1351-53 reveals the following:

| | Average Harvest 1351-53 | Percentage of Total |
|---|---|---|
| Wheat | 2,633 M tons | 63% |
| Corn | 746 | 18% |
| Barley | 356 | 9% |
| Rice | 416 | 10% |
| All cereals | 4,151 | 100% |

Wheat is by far the most important cereal; it is grown in every province and by almost every farmer, for most of whom it provides the direct means of subsistence. It is given a weight of about 50 percent in the national price index, and constitutes some 40-50 percent of all consumer expenditure for food.

The remaining cereals carry only an 8 percent weight in the national price index and are of much lesser importance than wheat. Barley is grown in the high mountainous regions and is primarily used as animal fodder in years of good wheat harvest. Rice grows only where there is sufficient water (Nangarhar, Kunar, Helmand, Kunduz, Herat and Takhar), and corn in the eastern valleys near Pakistan. Corn is also a fairly important second crop (following wheat) in some other parts of the country.

Wheat is produced on both irrigated and rain-fed land. About 1.4 million hectares (or about 50 percent of all irrigated land) is devoted to its production, and this land accounts for 75-80 percent of total wheat production. The production of wheat on the irrigated land is relatively stable from year to year. Generally, there is no noticeable drop in production on this land until the precipitation index falls. This land is seeded more heavily and yields about 1.3 tons per hectare using traditional inputs (up to 3.5 tons or more per hectare using improved seeds and fertilizer). The dry-farmed land produces 20-25 percent of the total production, and yields average about .5 tons/hectare. Most of the dry-farmed land is north of the Hindu Kush.

The dry farmed component is extremely volatile - depending upon the quantity of spring rainfall, dryland production can easily cause fluctuations in aggregate production of 10 percent or more from average. In a dry year (defined as the precipitation index being less than 70), dryland production can

fall by anywhere from 250 - 350,000 tons from normal (currently around 2.7 million tons), while in equally favorable years it can increase over the average by almost as much. The following graph shows fluctuations from trend for the period 1341 - 53 together with the corresponding precipitation index series.

Wheat Production Deviation from Trend

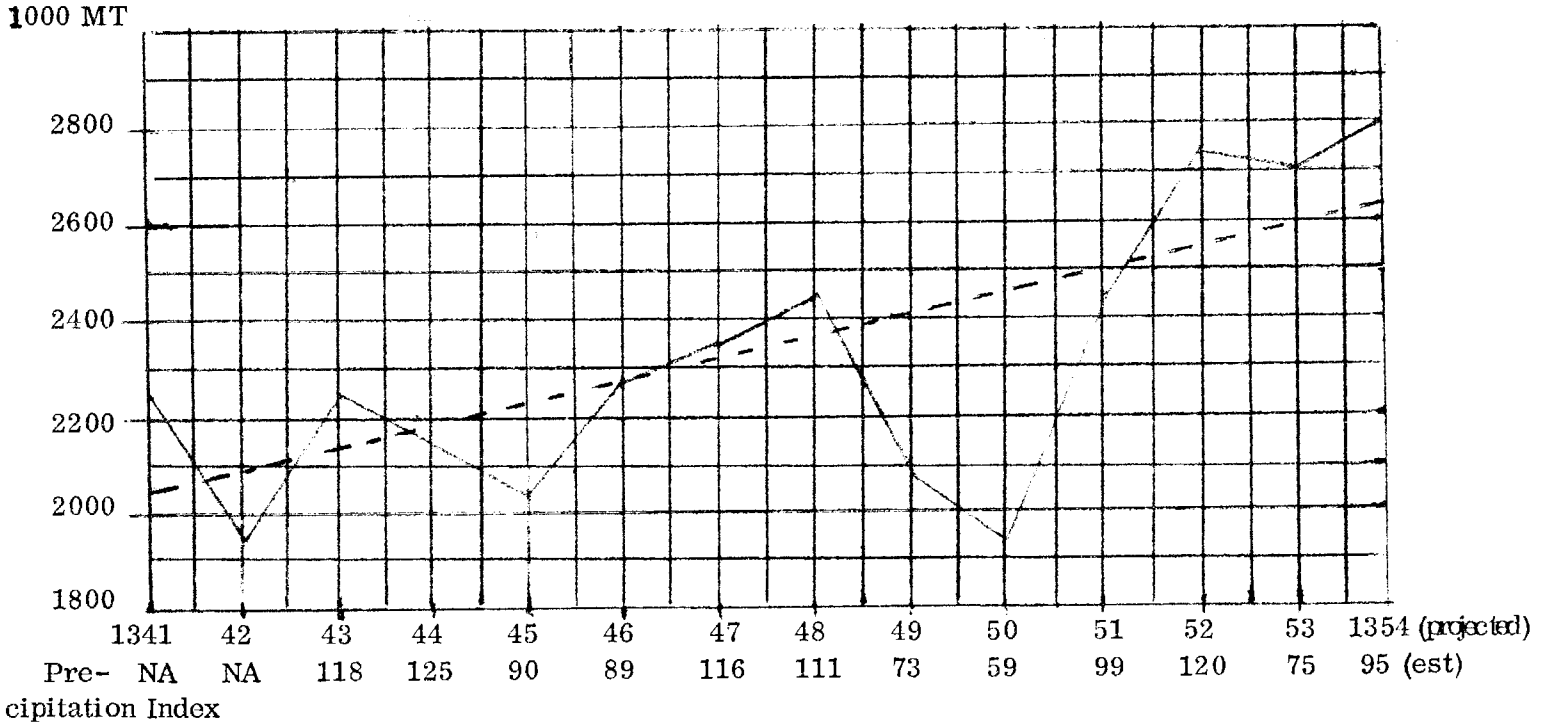
and Precipitation Series 1341-54

(see page 11.a)

The standard deviation for the production series illustrated by the chart is 211,000 or between eight percent and 11 percent of trend production.

The dryland crop is the critical component of total wheat production. Not only does it determine whether there will be a wheat surplus or deficit, but also forms the bulk of the wheat that enters the cash market. The regions of the north where most of

Wheat Production Deviation from Trend
and Precipitation Series 1341-54



the dry-farmed wheat is produced are also the main wheat surplus regions of the country. Therefore, if there is a poor dry-farmed harvest, there is a large drop in the amount of wheat that enters the national market, and prices rise considerably. The following graph illustrates the extreme variability in year-to-year wheat prices even though fluctuations were mitigated to some extent by imports.

Wheat Production and Wheat Prices

1341 - 1353

(see page 12.a. )

As the graph shows, in only three years was there an increase/decrease in wheat production and not a decrease/increase in wheat prices over the previous year.* Government imports and, in recent years, increased

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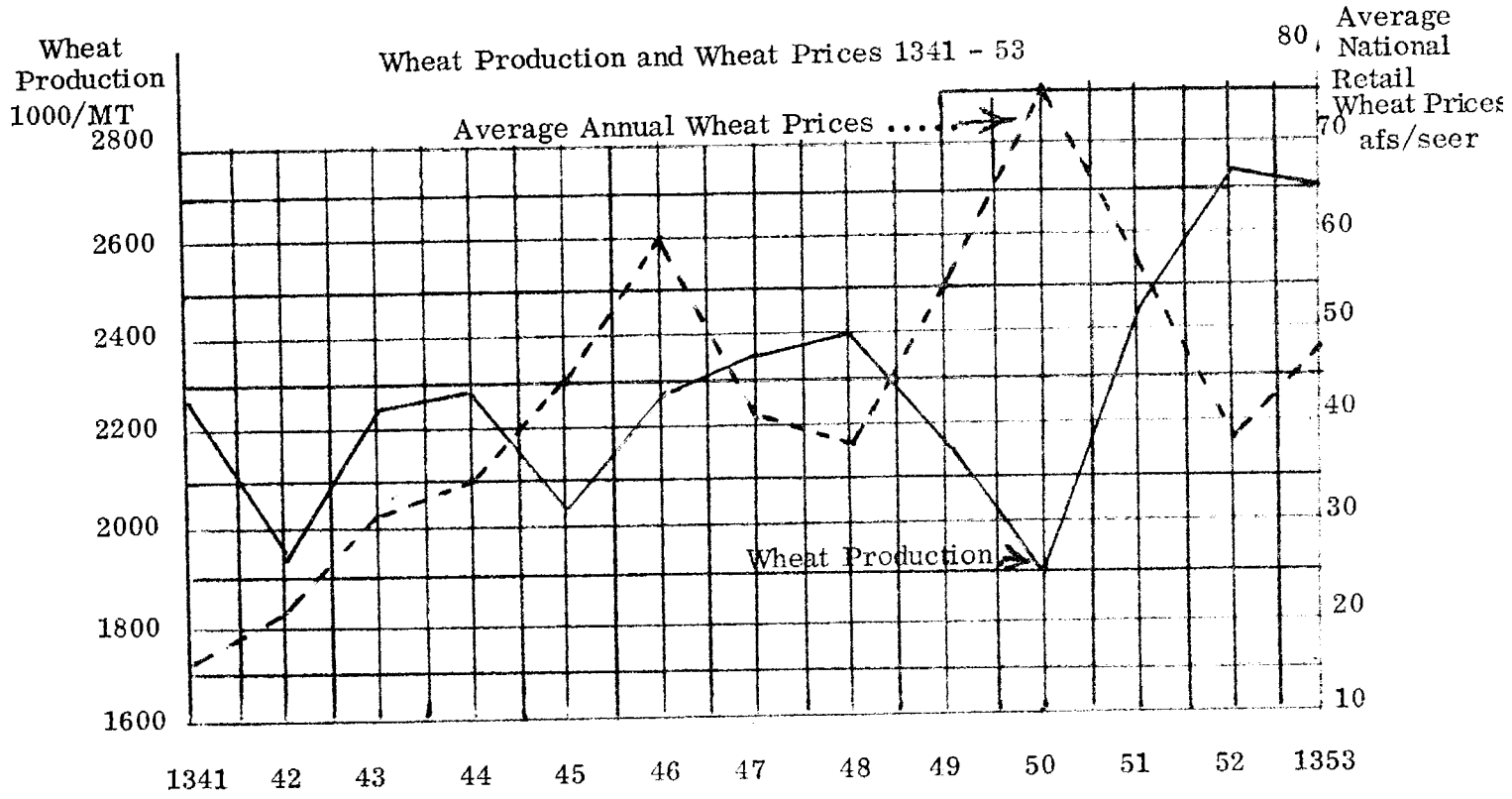
* Once again, the MAI's.


Wheat Production and Wheat Prices 1341 - 53
Wheat Production 1000/MT
Average National Retail Wheat Prices afs/seer
Average Annual Wheat Prices ....
Wheat Production
2800
2600
2400
2200
2000
1800
1600
80
70
60
50
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1341
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1353

self-sufficiency have tended to moderate the effects of shortages, but the inelastic demand for wheat is such that large fluctuations in wheat prices still occur.

The production swings and price fluctuations are not only harmful for their own sake, but also for their disruptive effects on the whole economic scene. One particular aspect of this is the large shift in real income from farmers to consumers in good harvest years and vice versa in poor years.

The demand for wheat is relatively inelastic, and has been estimated at about -0.3 in the normal range of prices. Both the price of wheat and the total wheat production show a slowly rising time trend, and the year to year deviation from trend of the two show a very good negative correlation. The effect of the production variation coupled with the relatively inelastic demand means large flucatuations in the year-to-year price of wheat that will be larger percentage-wise than the corresponding percentage fluctuations in wheat output.* This has profound effects on farmers' incomes. Whenever production increases from one year to the next, whether through their own initiative, or due to the weather, the price of wheat falls by more than production

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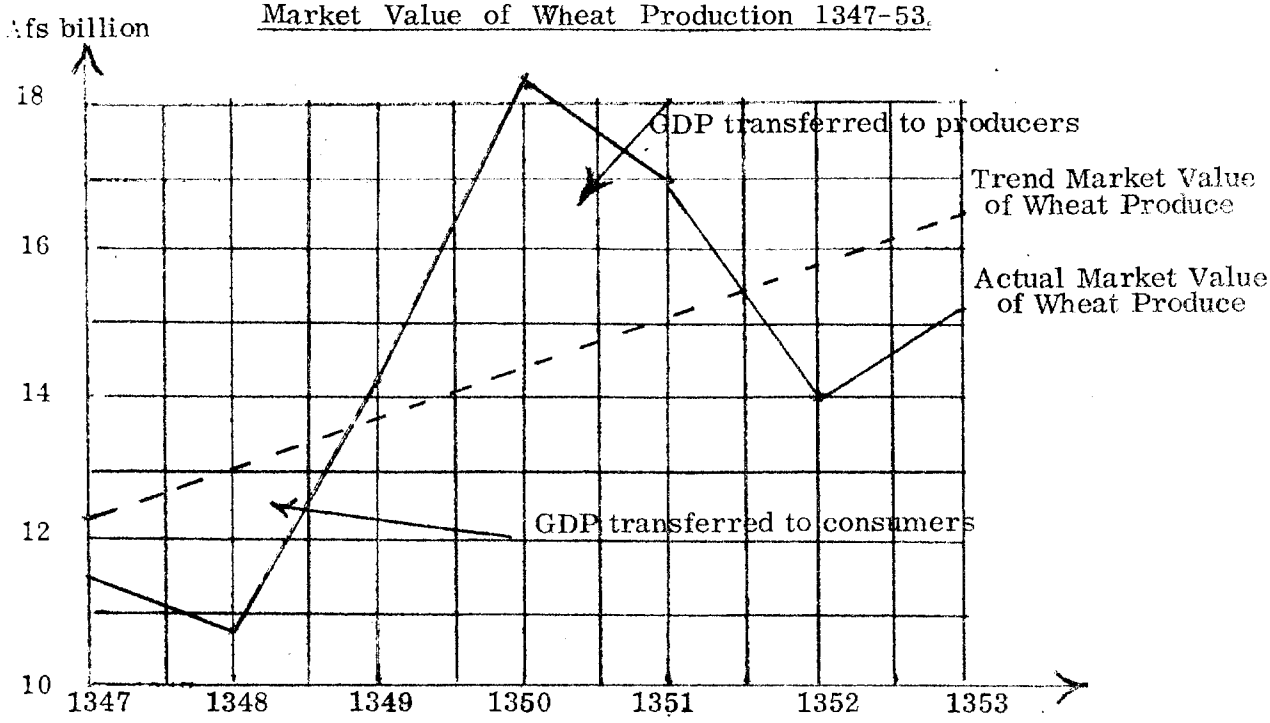
* With an elasticity coefficient of -0.3, the relative change in price is, ceteris paribus, 3.3 times the relative change in quantity.

increases, and the market value of farm produce falls. Only if demand increases simultaneously enough to offset the effect of inelastic demand can farmer incomes remain constant or increase with increased production. These variations in output result in large transfers in real income and purchasing power between consumers and producers, depending upon the harvest. The following graph gives an idea of these transfers in GDP.




It is difficult to calculate the exact transfers of income from consumers to producers and vice versa, because it is difficult to know the exact proportion of wheat that enters the market each year. This proportion almost definitely increases in good years and decreases in poor years, and is thus becomes a

varying percentage of the total as most farmers tend to market only their surplus*. If one assumes a price elasticity of demand of -.3, then this suspicion is supported by the available price and production data. Nevertheless, the percentage marketed would have to vary greatly to prevent the value of the amount actually marketed from displaying the same trend as the value of aggregate wheat production.

There is no doubt however that the value of wheat production shows the opposite movement of aggregate production. In the years of below average wheat production 1349-51, wheat production has above average value; and in the periods of above average production 1347-48 and 1352-53 wheat production had below average value. If one assumes 1/3 of aggregate production in marketed, then real income transfers on the order of Afs. 1.5 billion, or some 1-2 percent of GDP can take place from one year to the next. In terms of total production, as much as 6 percent or more of GDP can change sectors. This is certainly excessive, and can hardly be conducive to stable, predictable, economic conditions.

Agricultural Exports

The effect of precipitation upon the production of fruits and vegetables is not as severe as that upon wheat, as most of these are grown on irrigated land.

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* Although higher prices conceivably induce subsistance farmers to market a slightly increased proportion of their harvest than they would if the price were lower.

Thus while wheat production dropped over 20 percent from 1348 to 1350, fruits and vegetables production dropped by less than 10 percent. One would ordinarily expect fruit exports to drop in years of drought for two reasons. First, there is lower aggregate production and unless an increased percentage of produce is exported, then total exports will drop. Secondly, one would expect consumption of fruits and vegetables to increase because people respond to decreased production (and hence consumption) of cereals through increased consumption of fruits and vegetables. Surprisingly, the anticipated drop in consumption did not materialze, as the following table indicates.

Production and Exports of Fruits Products 1346-1352

| Year | Production 000 tons | Exports | Exports as % of Production | Export Revenue $ Millions |
|---|---|---|---|---|
| 1346 | 826 | 112 | 13.6 | 26.2 |
| 1347 | 834 | 100 | 12.0 | 27.0 |
| 1348 | 842 | 116 | 13.8 | 28.4 |
| 1349 | 809 | 117 | 14.5 | 29.0 |
| 1350 | 750 | 124 | 16.5 | 26.9 |
| 1351 | 820 | 127 | 15.5 | 42.0 |
| 1352** | 840 | 134 | 16.0 | 69.0* |
| 1353** | 865 | 192 | 22.0 | 84.8* |

Sources: Ministry of Commerce, Central Statistics Office, Da Afghanistan Bank.

* believed to be overestimates
** estimates

What emerges from the above is that the exports of fruits (vegetable exports are negligible) do not appear to be dependent upon Afghanistan's weather conditions. Despite major shortfalls in production in the drought years 1349-50, exports of fruit products continued rising to record levels each year, not only on a percentage basis, but also absolutely. The surprising result that emerges is that exports of fruit are primarily determined by the conditions of the export markets, and not by domestic demand, i.e. domestic consumption appears to take on a more residual role. At least for fruits products, that comprise some 30-40 percent of all exports, domestic weather conditions appear to have no adverse effects at all. The same is true with cotton; there appear to be no weather effects on the level of exports at all, they being determined by total production, domestic needs and government pricing policies.

Thus agricultural exports appear primarily determined by foreign demand, and not by domestic supply. The one exception appears to be karakul; recent high domestic meat prices have resulted in farmers keeping the karakul lambs for meat production rather than slaughtering them soon after birth for their pelts. This has recently caused a drop in karakul exports. The drought of 1349-50 also resulted in large drops in sheep herd size (see next section), and karakul exports.

Livestock

Livestock production is a major component of total agricultural sector. It comprises some 20 percent of the agricultural sector's contribution to the

GDP, and accounts for some 20 percent of export earnings in the form of karakul pelts, wool, and carpets. Farmers typically raise livestock and grow crops, producing their crops in the valley floors where irrigated water is available and sending their flocks of goats, sheep and cattle into the hills to graze. Livestock raising is also the principle activity of the nomads who move during the year from winter to summer grazing lands and back.

The livestock sector is particularly vulnerable to the effects of weather. It also takes considerably longer to overcome the effects of drought than does agriculture. As the following table shows, livestock herds were decimated during the drought of 1349-50 and have to this day (1354) not completely been rebuilt.

Estimates of Livestock Numbers
(millions)

| | | | Projections | |
|---|---|---|---|---|
| Animal | 1348 | 1350 | 1353 | 1358 |
| Mutton Sheep | 15 | 9 | 9.83 | 11.38 |
| Karakuls | 7 | 3.8 | 4.15 | 4.67 |
| Cattle | 3.7 | 3.4 | 3.4 | 3.5 |
| Goats | 3.2 | 3.0 | 3.0 | 3.1 |
| Donkeys | 1.3 | 1.3 | 1.3 | 1.2 |
| Camels | .3 | .3 | .3 | .2 |
| Horses, Mules | .4 | .4 | .4 | .3 |

Source: Estimates of IBRD Agricultural Sector Survey, as reproduced in IBRD, Current Economic Situation and Prospects for Afghanistan, Table 7.3.

As can be seen livestock herds take an extemely long time to replenish themselves. The issue though is not only one of the availability of feed supplies

and water, but also of people being forced to sell their livestock to ensure their own survival.

The price of meat, which carries a weight of 10.1 percent in the national price index, illustrates the effects of these developments. The years of stable prices preceding the 1349-50 drought have been followed by years of rapid increases.

National Price Index for Meat 1346-1353

| | |
|---|---|
| 1346 | 222.6 |
| 1347 | 191.6 |
| 1348 | 214.9 |
| 1349 | 222.6 |
| 1350 | 204.2 |
| 1351 | 244.5 |
| 1352 | 310.9 |
| 1353 | 355.8 |

Source: Central Statistics Office and Da Afghanistan Bank.

The subsequently high prices following the years 1349-50 have further increased the disarray in the livestock sector. Farmers have been induced to sell valuable breeding stock, and raise karakul sheep for meat, resulting in lower rates in livestock replenishment and growth, and decreased karakul pelt exports.

## AFGHANISTAN'S FOOD NEEDS

The question of Afghanistan's food needs actually consists of two independent but ultimately related issues. First, are available food supplies growing at a rate

sufficient to guarantee the ability to satisfy future needs.? Population growth requires that food supplies grow at least as fast if per capita consumption is not to fall, and the increasing prosperity of the nation places further demands on food supplies as people try to increase and diversify their food consumption. And secondly, does Afghanistan produce sufficient food in normal years to provide adequate and balanced nourishment for all its inhabitants? If it does not, then first priority should be given to attaining this goal, without harming the farmers who produce the food. While for the moment, the issues of self-sufficiency and effects on price, and income will be skirted, it would presently seem most desirable to satisfy all needs, present and future through increased domestic production.

Future Needs

The official population estimate for mid-1975 is 19.1 million. This estimate is based upon several pilot studies undertaken in the 1960's and has been extrapolated from ever since. All indications are, however, that this figure is an over-estimate; more recent studies place the population in the neighborhood of 12-13 million.

The population of Afghanistan appears to be growing at 2.2-2.5 percent per year, with the most recent and reliable estimate at the lower end of this range. The same source has estimated Afghanistan's birth rate at 43.0 per 1,000 and its mortality rate at 21.0 per 1,000. This high mortality rate holds

population growth in check at a moderate 2.2 percent per annum; however, it is neither moral nor wise to expect this pattern to persist. Health services are constantly improving causing death rates to decline without any drop in the birth rate. Birth rates primarily depend upon deeply engrained social and economic factors that change only with time and socio-economic development. The latter is slow in coming in Afghanistan. Hence, the demands population places upon food production in Afghanistan will certainly increase before they stablize and eventually fall. For the next few years though, it would appear safe to assume an annual rate of population growth of about 2.2 percent.

Once again, no reliable estimate of national income exists, and one is forced to rely upon educated guesses and government development goals in determining the additional income-generated demand for food. The GOA is aiming at a 5 percent increase in real GDP in the year 1354, and a 4 percent increase in agricultural output. On the basis of this, one obtains a 6 percent growth rate in the non-agricultural sector. These figures are quite compatible with previous estimates, and increased agricultural income, particularly from exports and higher domestic prices. The rural population is growing at about 2.0 percent, and the urban at 4.5 percent. These figures are compatible with overall population growth of 2.2 percent. If one equates rural with agricultural,

and urban with non-agriculture, something that can reasonably safely be done, one obtains respective per capita income increases of 2.0 percent and 1.5 percent respectively. The average rate of growth would be a weighted average of the two, based upon the relative shares of the total population, and would be calculated as follows.

Overall rate of growth of per capita income = (% of population in agriculture) (Growth rate of per capita agricultural income) + (% of population in non-agriculture) (Growth rate of per capita non-agricultural incomes).

This procedure gives (.85) (2.0) + (.15) (1.5) = 1.7 + .225 = 1.925 (non-nomadic population included only, and overall population assumed growing at 2.2 percent).

On the basis of the preceding calculations, real per capita incomes are increasing at average of 1.9 percent annually. Although no work appears to have been done on the income elasticity of demand in Afghanistan, it is safe to assume it is in the vicinity of 0.8 as in most countries with per capita annual incomes of less than $100. Accordingly, 0.8 seems a safe estimate when one considers per capita incomes must rise to $500 before this figure drops to 0.6.Multiplying the estimates of per capita income growth and the income elasticity of demand for food, one obtains estimates of the rate of growth of demand for food due to increasing real incomes of about 1.5 percent per year.

Combining these two phenomena gives the following. Due to population growth alone, the demand for food is growing at 2.2 percent per annum, and

unless food is imported or average per capita consumption allowed to drop, food production will have to increase at an equal rate. On top of this, income effects will add or subtract from this demand. With per capita GDP growing at an average 1.9 percent per year, aggregate food production will have to increase an additional 1.5 percent per year, giving a combined rate of growth of about 3.7 percent per year, on average. This rate would need to be maintained until such time as population growth slows down* or incomes rise to the point where the income elasticity of demand for food drops. Given that agricultural output variation can easily result in excess drops or excess increases in per capita incomes at the current level of development in the Afghan economy, year-to-year aggregate demand could increase from any where from 2.2 percent less to in excess of 3.7 percent.

Current Needs

It is very difficult to apply standard procedures to determine the degree of adequacy of diets in Afghanistan. Standard estimation techniques would require accurate knowledge of the population and total actual consumption. Unfortunately neither is accurately known. Estimates of population, as mentioned earlier range from 12 to almost 20 million. Food consumption figures can be reasonably well estimated from production and export - import figures. While

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* The probability of an increase in growth rate is substantially higher than a decrease for the next decade or so.

foreign trade statistics are fairly reliable, estimates of total domestic production are based upon extrapolation from prices, rainfall, area under cultivation and application rates of fertilizers and improved-yield seeds, and are hence nothing better than good estimates. Applying the preceding statistics to cereal, for which production figures are felt to be fairly reliable, an annual per capita consumption figure in the range of

$$\frac{\text{1240 thousand tons}}{\text{20 million person}} \quad \text{to} \quad \frac{\text{4240 tons thousand}}{\text{12 million person}}$$

or 212 kg to 353 kg per person per year result.* These production figures are for 1353 (1974/75), a good but not record year of less than average precipitation. If one compares these consumption figures with the recommended 210 kg per person per year, (21 p. 52 and 15 p. 5) one notices that using the higher population estimates gives a precarious cereal population balance that would be particularly critical in years of poor harvest. If, in fact, the population is near the lower end of the range, then adequate cereal is probably produced even in years of poor harvest.

Afghanistan's consumption of protein is equally adequate. On the basis of cereal consumption (which is about 10 percent protein) consumption would amount to some 60-89 grain protein per day. Furthermore, Afghans are red-meat eaters, and consume an approximate 8 kg/person annually (13, p. C-2). Surveys

* These figures reflects more accurately gross availability (consumption, seed, waste, etc), and probably overestimate consumption. Some of this production is used as animal feed (barley) in years of good wheat harvest, and is hence not consumed by humans. This was probably the case in 1353. Even if all barley were used as animal feed, the grass availability would be in the 194 kg to 323 kg range.

have shown that fully 50 percent of the families surveyed had consumed meat within six days, and 95 of them had consumed milk within two (14, pp. 96-100). With the recommended minimum about 60 grains of protein per day (2, p.44), Afghans must certainly exceed this by a comfortable margin.

Fats, the third major component of a balanced diet, also appear to be consumed in adequate amounts in Afghanistan. On the basis of imports, existing stocks and domestic production in 1352, one obtains per capita daily consumption figures of vegetable oil (vegoil) of 23-38 grains, the USDA recommended minimum for this part of the world being 39 grains (2, p. 45). These figures fail to include the consumption of animal fat and unrecorded small-scale sesame and linseed oil (of which a considerable amount is pressed north of the Hindu Kush). Taking these two aditional sources into account, it is most likely that per capita fat consumption is also in excess of the recommended amounts.

On the basis of the preceding it would not appear that Afghanistan has problems of malnutrition or undernourshment. The general impression one gains of both rural and urban Afghans appears to support this conclusion. While quite lean, they exhibit little, if any, of the misery prevalent in their eastern neighbors. One also hardly ever sees signs of overeating. Nevertheless, one cannot say that malnutrition and undernounshment are non-existent in

Afghanistan; on the contrary they do exist. In years of poor harvest, there is considerable undernourishment, even starvation, but this may be as much a problem of distribution as one of an actual shortage. The malnutrition problems that exist are all of quite specialized nature.

There is a deficiency of certain necessary vitamins, notably vitamins A and C, and to the extent that the chadri is worn, vitamin D. There is also a deficiency in certain minerals, most notably iodine. In mountainous countries like Afghanistan, most of the iodine has been leached away, making it difficult for inhabitants of these regions to obtain adequate amounts. The vitamin shortages are not critical; vegetables rich in vitamins A and C grow abundantly in Afghanistan, and the solution to these problems is primarily one of education.

Education also lies at the root of certainly the malnutrition problem in Afghanistan, that of the 0-5 year olds.* The infant mortality rate of the 0-5 age group has been estimated at 50 percent; half of all Afghan children die by age five. The sole reason for this is a failure to appreciate the special needs of the young child. It cannot chew, but is given dry tough bread (Nan); it drinks tea that contains no nourishment, and more often than not receives the least desirable and least nourishing foods at a time when its needs are greatest. These undernourished

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* Most of this paragraph originated in discussion with Mr. Paul Rusby, USAID Food for Peace Officer

children are particulary susceptible and constantly exposed to disease and illness of all sorts in an environment of primitive hygienic standards. The children that survive are a tough, battered lot. It is difficult to estimate the effects of this childhood deprivation, but the loss in human wealth and creative potential has to be enormous. There is no more a shortage of food for the young than there is for anyone else, it is only a question of educating the mothers as to the special needs and consideration that the young require.

While the preceding analysis gives a reasonable analysis in terms of national averages, it tells little about the incidence of shortages and the everyday distribution of food. Those that can afford the balanced, adequate diets will be the more well-to-do, and the poor will show the greatest deficiencies. The distribution of income is skewed in Afghanistan, but is not felt to be as much so as in many developing countries. One study undertaken in Kabul gave the following distribution.

Income Distribution of Kabul Households, 1347

| Quarterly Income Afs. 1,000 | Percent | | Cumulative Percent | |
|---|---|---|---|---|
| | Income | Households | Income | Households |
| Under 7.2 | 18.7 | 56.0 | 18.7 | 56.0 |
| 7.3 - 18.0 | 30.3 | 31.5 | 49.0 | 87.5 |
| 18.1-30.0 | 20.1 | 6.5 | 69.1 | 94.0 |
| 30.0 and over | 30.9 | 6.0 | 100.0 | 100.0 |

Source: Ministry of Planning, Survey of Progress, 1968-69, pp. 38-69.

This survey revealed that 60 percent of the people earned only 22 percent of the income. It is, however, difficult to extrapolate and it is not known whether the

nation-wide distribution is more or less skewed. The distribution of food is never as skewed as the distribution of income, so it is quite likely that average consumption, and consumption of the average person are reasonably comparable.

The geographic distribution of food is another matter. Only the large cities are connected by all-weather roads, and are thus guaranteed adequate supplies all year round. The more inaccessible regions find themselves primarly dependent upon the seasonal produce of the region (apart from stored wheat, etc.) and will consequently suffer seasonal surfeits and shortages of foods, and shortages of those goods that must come from outside the region. While movement in normal years from rural (surplus) to urban (deficit) areas does take place on a sustained scale, the drought years of 1349-50 showed that movement in the opposite direction is limited. For this reason, the previous calculations may well have been misleading, and there could exist problems of nutrition. These would not be symptoms of inadequate production though, rather inadequate distribution.

## DEPENDENCE UPON IMPORTS

Afghanistan imports a considerable amount of food. The major imports are all basic requirements that constitute essential elements of the Afghan diet. A shortage of any of these items can be critical, and become an issue of social and political dimensions that the government must remedy. The following table

shows imports of various food items, and the commodity assistance portion.

Imports of Major Foodstuffs
1348-1353
(in thousand tons, commodity assistance portion below in brackets)

| | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 |
|---|---|---|---|---|---|---|
| Wheat | 76.0 | 60.0 | 216.5 | 187.7 | 63.1 | 20.0 |
| | (76.0) | (60.0) | (216.5) | (187.7) | (63.1) | (5.0) |
| Sugar | 42.1 | 54.1 | 45.0 | 62.6 | 59.9 | 52.0* |
| | (30.1) | (30.8) | (17.2) | (1.9) | (1.3) | |
| Vegoil | 11.8 | 8.0 | 11.5 | 14.2 | 10.7 | 7.5 |
| | | | | | (4.7) | (.6) |
| Tea | 15.5 | 12.3 | 16.4 | 14.5 | 10.0 | 15.0* |

Source: IMF and AID estimates from GOA figures.

* Estimates, project component unknown.

To emphasize the importance of these imports, the following table shows imports as a percentage of actual consumption in recent years.

Imports of Food Commodities as a Percentage of Total Consumption

| | Average 1348-52 |
|---|---|
| Wheat | 5.4% |
| Sugar | 86.7% |
| Tea | 100.0% |
| Vegoil | 77.1% |

In the past, commodity assistance constituted major portions of total food imports, but this pattern is unlikely to continue. Prior to 1353, all wheat imports had been at concessional terms, as well as major percentages of sugar and vegoil. In most recent years, ever decreasing percentages of sugar imports have been at concessional terms, and in 1353 only 1/4 of wheat imports were concessional. Forthermore, the U.S. government has indicated that supplies on concessional terms would not be available in 1975. Therefore, barring unforeseen shortages of critical proportions, concessional food aid is likely to be scarce.

The production of all major food imports except tea does take place in Afghanistan. Unfortunately, irrigated land is scarce, and the amounts of land necessary for self-sufficiency in wheat, vegoil (extracted primarily from cotton seed), and sugar is currently unavailable. Furthermore, there are bottlenecks at the processing stages. Afghanistan possess only one sugar mill of any real significance, a sugar-beet processing facility at Baghlan. It has been operating at about 7-8000 tons annually, but is expected this year, 1354, to reach its capacity of 10,000 tons.

There is considerable interest in constructing additional sugar refining facilities in Afghanistan. Report after report supports such a project, and it currently appears that new facilities will be built. Recent high prices of sugar have only served to strengthen this interest. Closer examination reveals, however, that Afghanistan would be better off importing sugar and exporting cotton. The economic reasons for this policy are solid.

Increased sugar production can only come at the expense of other crops, most notably wheat and cotton. If increased land in the vicinity of the processing facilities were available, it has been shown that a domestic sugar industry is viable, but otherwise the crops it displaces are of higher economic value as the following table shows.* Cotton is superior in almost every category of agricultural efficiency.

Relative Agricultural Efficiency of Seed Cotton, Wheat, and Sugar Beets
( The lower the ranking the better)

| Crop | Sugar Beet | Wheat | Seed Cotton |
|---|---|---|---|
| Value Added/ton | 3 | 2 | 1 |
| Foreign Exchange, Benefit/ton | 3 | 2 | 1 |
| Value Added/Unit of Water | 3 | 2 | 1 |
| Foreign Exchange/Unit of Water | 3 | 1 | 2 |
| Value Added/Jerib | 3 | 2 | 1 |
| Foreign Exchange Benefits/Jerib | 2 | 3 | 1 |

Source: Urwick, Lugg, and Gould, Inc., The Sugar Industry of Afghanistan, p. 8.

If the most desirable patterns from a social perspective, the same is true for the farmer himself as the following table shows.

Farmer Costs and Benefits of Producing Wheat, Sugar, and Cotton

| | Return[1] | | Cost[2] | Benefit/Cost |
|---|---|---|---|---|
| | Tons yield/ha | Price/ton | Afs/ha | Afs/ha | Ratio |
| Wheat | 3.5 | 6,421 | 22,500 | 10,300 | 2.2 |
| Seed Cotton | 2.2 | 15,000 | 33,000 | 12,000 | 2.75 |
| Sugar Beets | 13.4 | 780 | 10,450 | 6,700 | 1.6 |

1. Based upon prices mid-1354

2. Based upon 1347 prices for all factors, costs except fertilizer that are mid 1354 prices.

Note: Cotton, wheat production assumed using improved seed and fertilizer. Sugar beet production as of yet uses very little fertilizer, consequently costs for sugar beets have very small chemical fertilizer component.

Source: Urwick, Lugg, and Gould, Inc. The Sugar Industry of Afghanistan, Appendix VI.

* Sugar beet is bulky and heavy, and transport costs require the distance of production to the refinery or satelite station not be more than 30 km.

In addition, sugar beets cannot be double cropped like wheat and cotton, and deplete the soil more than do wheat and cotton. It also requires the greatest amount of water (crucial in water-scarce Afghanistan), followed by cotton and wheat.

The argument for cotton production is further strengthened by the existence of excess capacity in cotton-ginning than refining capacity for sugar.* Also, the by-product of cotton-ginning, cotton seeds is the major source of domestically produced edible oil. Currently, production does not satisfy needs, although this deficit could be reduced if the remaining 25 percent of the oil content were to be extracted. (17,p.11). Finally, a protein-rich by-product, cottonseed cake, would be produced in increased amounts.

Whether Afghanistan is overly dependent upon imported food products or not is a matter of debate. Some circles argue that Afghanistan should devote its scarce resources (primarily irrigated land) to the production of products in which it has a comparative advantage, in this case cotton, and use the foreign exchange proceeds to purchase sugar, in which it is at a comparative disadvantage in production. This pattern of trade and production would make Afghanistan and its trading partners both better off than either would be in its absence. In return for producing cotton

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* Although at current rates of cotton production growth, the capacity of 180-220,000 tons will soon be reached.

and exporting it, Afghanistan could import more than twice as much sugar as it could produce on that same land had it been devoted to sugar beet production.

The arguments for domestic production are not insignificant, however. Commodity prices have displayed considerable fluctuation in recent years, and there is no guarantee that the pattern of cotton prices being significantly higher than sugar prices will persist; at worst the pattern could reverse, putting Afghanistan in an impossible position. At the same time, Afghanistan's land-locked, inaccessible position creates special circumstances that would make self-sufficiency highly desirable. The transportation of merchandise to and from Afghanistan is a lengthy and costly process, and Afghanistan's access to the Pakistani seaport is a tenuous affair. Considerable weight must therefore be given to the national security issues involved. Whether the social cost of producing for self-sufficiency is offset by the value placed upon self-sufficiency is unclear, but given the large gains to be had by producing according to comparative advantage and trading, the value attached to self-sufficiency would have to be quite high. There is also the difficult trade-off between vegoil and sugar that will have to be considered, until such time as sufficient land and processing facilities are available to cultivate both.

## SUBSISTENCE FARMING

A major obstacle in the development of agriculture is the nature of farming itself. The great majority of farmers in Afghanistan must be classified as subsistence farmers, 45 percent farming less than half a hectare (18). After taking a few sacks to market to exchange for tea, sugar, and other necessities, and retaining some seed for next year's crop, barely enough wheat remains to support his family. It is estimated that about 60 percent of total wheat production is consumed where produced, some 20-25 percent bartered, and only 20 percent sold for cash (19, p.1). Consequently, the annual cash income in rural areas has been estimated to be only $5 or less (17,p.11).

According to estimates made by Maxwell Fry, some 50 percent of the GNP is produced in the subsistence sector, and is non-monetized (9, Table 2.14, p.37). Although the economy is becoming increasingly monetized, it is occurring only very slowly. It took 10 years from 1342-52 for the share of the subsistence economy to drop from 54 percent to 49 percent of GNP. While these figures may be in error, it is nevertheless clear that a substantial portion of the agricultural economy is at or near subsistence and yet to be monetized, and until it is, agricultural production will remain sluggish and backward.

This lack of financial resources prevents farm improvement. These small farmers find themselves caught in a vicious circle. In the absence of easily obtainable agricultural credit, which though improving is still difficult to obtain except on exorbitant terms, the small farmers must produce a marketable surplus in order to be able to purchase these inputs. However, were he able to produce more on his land be would most surely be doing so. He thus needs the new inputs to produce the surplus to buy the inputs. The situation is close to hopeless in the absence of easy credit.

Not only do the farmers have little financial means to improve their farms, they also have little incentive. Land tenure patterns discourage investment in irrigation and other land improvements. The only reasonably comprehensive study of land ownership that has been done gives quite a skewed picture.

Land Ownership Patterns in Afghanistan

| Size | Owners | | Area of Holdings | |
|---|---|---|---|---|
| in jeribs | Number | Percent | Million jerib | Percent |
| 0-2 | 257,872 | 42.0 | 0.3 | 1.6 |
| 3-20 | 263,234 | 43.0 | 3.0 | 15.8 |
| 21-30 | 32,344 | 3.0 | 0.8 | 4.2 |
| 31-50 | 26,240 | 4.0 | 1.0 | 5.3 |
| 51-100 | 22,484 | 3.6 | 1.5 | 7.9 |
| 101-500 | 13,832 | 2.2 | 2.9 | 15.2 |
| 501-15,100 | 1,208 | 0.2 | 9.5 | 50.0 |
| Total | 619,233 | 100 | 19.0 | 100 |

Source: A.D. Davydov, The Development of Capitalism in Afghanistan, Moscow 1962, p.147. Table reproduced in L. Baron, The Water Supply Constraint in Afghanistan, unpublished McGill University thesis.

The table shows only 6 percent of the landowners own 70 percent of the land. Although this study is felt to overstate its case, rather concentrated pattern of land ownership nevertheless exists.* Most of the large landholdings are in the dry farmed regions of the north, and in the south-west.** The holdings of the highly productive irrigated land are much less concentrated. A recent survey (20) indicated that in the best agricultural regions, those with the highest potential for agricultural development and that have had the most exposure to modern technology, the distribution of land ownership is much less skewed. Their Gini ratio of 0.36 is significantly lower than that derived from Davydov's figures, 0.82. Thus while the distribution of all land may be extemely skewed, the ownership of the highly productive irrigated land appears to be much more equitable, with a large number of middle-sized holdings.

The pattterns of farming and land tenure do not emerge from the above. A nationwide survey has not been carried out, but samples have been taken in the same set of provinces in which the above mentioned survey was conducted. Again, the villages sampled were all in the wealthier provinces, and farmed irrigated land almost exclusively.

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* Louis Dupree, in his recent book, Afghanistan, states, with some confidence that only 30 landowners in the entire country own over 1,000 jerib (200 ha).

** All the arable land in Nimroz province is believed to be owned by 8 khans.

The results are reproduced below.

Landholding Patterns in Seven Afghan Provinces (in percentages)

| Province | Landlords | Owner-Operators | Renters | Sharecroppers | Agricultural Workers |
|---|---|---|---|---|---|
| Baghlan | 10.2 | 55.2 | 2.9 | 22.2 | 9.5 |
| Kandahar | 14.9 | 36.4 | 1.6 | 35.2 | 11.6 |
| Parwan | 1.1 | 86.2 | 2.3 | 2.3 | 8.1 |
| Ghazni | 9.8 | 53.2 | .6 | 36.4 | - |
| Kunduz | 6.4 | 60.6 | 2.4 | 16.0 | 15.2 |
| Nangarhar | 23.4 | 54.1 | 2.7 | 19.8 | - |
| Laghman | 19.5 | 63.4 | - | 17.1 | - |

Source: Ministry of Planning, Survey of Progress 1971-72, pp.

In all these regions, one notices a preponderance of owner-operated farms. Renters constitute a uniformly small percentage of the farmers. Sharecropping, while not so prevalent in the areas sampled, is generally quite common, and takes two forms - buzgars and keshtgars. Buzgars, referred to above as sharecroppers, provide all the inputs except land and water, and receive 50 percent of the crop. Kashtegars, estimated at half a million, provide only labor and receive only 20 percent of the crop. They are the agricultural workers of the table above. Intermediate arrangements also exist. From a broad geographical perspective, sharecroppers appear most prevalent in the south and southwest. Owner-operaters become more and more prevalent as one moves north and northwest. North of the Hindu Kush sharecroppers again become prevalent but not to the extent of the south and southwest (21).

The crucial question is the extent to which the distribution of land and tenure patterns play a role in the current stagnation and future development of agriculture. There is no conclusive evidence; some sources cite the lack of farmer incentive arising from tenure patterns as perhaps the principal constraint to increased production. The argument here is they have no incentive to invest in land improvement and modern techniques if the bulk of subsequent production increases accrue to the land owners, and if their right to farm the land is neither permanent nor secure, but is based on easily terminated verbal agreement.* On the other hand, one study found sharecroppers and renters to be more productive per hectare than owner-operators, probably because of the necessity to eke more from their small plots if they are to retain significant amounts for themselves (20, p.33).

If the sharecropper is slightly more productive, but shows less tendency to innovate and invest, is this deficiency compensated for by the landlords? Again, evidence is contradictory: the RRNA study, The Afghan Farmer, finds landlords slightly more innovative than owner-operators and sharecroppers. This would indicate that at least in the cases where they provided the inputs, output would increase slightly faster than under owner-operated conditions. But as indicated before, the distribution of land in the region the survey was

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* For major land improvement he does not have the land necessary for collateral. Credit for fertilizers, etc. is extended in theory to all farmers against promissory notes, if they are recognized socially as responsible farmers, etc

taken, was comparatively equitable, with few holdings over 20 hectares. The social and economic differences between landlords and owner-operators in particular are not that marked. In regions of very large landholdings, the pattern appears different. Here the landlords do not show much inclination towards using modern inputs or techniques. Perhaps production is sufficiently large for them not to be bothered with even more production, considering the additional cost and effort that must be expended to make the methods profitable. Like the sharecropper, he probably does not feel like sharing increased production that he himself has provided for. The considerable dry-farmed portion of land that comprises much of the large landholdings, also makes the land much less appropriate for improved seeds and fertilizers. All in all, it is difficult to tell whether the land tenure patterns themselves are major constraints on agricultural development or not. Most every other country that has instituted land reform has seen production drop, at least initially, as the services and infrastructure provided by the landlords disappeared. Ultimately though, production has generally increased. In Afghanistan, land ownership is so much compensated for by the productive quality of the land that the effects of land reform upon production would be even more uncertain.

The Afghan farmer may be illiterate, uneducated and poor, but does not appear to show the inflexibility towards change that is commonly ascribed to him. The RRNA survey of the Afghan farmer concludes that attributes

towards change are highly positive, and that it is not personal characteristics that constitute the major barrier to innovation and adaption of modern techniques, rather the lack of anything to adapt. A lack of supplies was said to be the principle obstacle to adaption, followed by lack of funds or credit, and finally ignorance of the innovation or not being convinced of its value. These farmers are certainly responsive to price incentives as witnessed by cotton/wheat production patterns in response to the cotton/wheat price ratio, in certain regions. Before extrapolating, it must be remembered the survey was taken in the regions of greatest potential. Most farmers were owner-operators who farmed irrigated land and produced for cash. These farmers had every incentive to increase production, and faced little risk.

Even if those farmers were as rational as the survey suggests, they represent the vanguard. Most of the remaining farmers, particularly the poorer subsistence farmers, are nowhere near as dynamic. An FAO expert, Dr. Tamboli conducted a two-year fertilizer experimentation program in 10 fairly representative provinces. He found that: 1) Afghan farmers use fertilizers when the rate of return is higher than 300 percent and 2) on average, the input-output ratio obtained ranged from 1:4 to 1:4.7 (19, p.8). His figures indicate a rather extreme risk-averseness on the part of Afghan farmers despite high average returns. This risk-averseness and tending towards isolation has several origins. One was well put forward by J. Barier:

> "In effect, as long as the farmer has no debts and is producing crops for self-consumption, his own living conditions are preserved at a relatively high level compared with conditions in other Asian countries....Indeed, the more interference from the government in the agricultural sector, the more the Afghan farmer seems to retreat into the shell of self consumption or barter."*

Most farmers live a precarious existence; they know that by using old and time-proven techniques, they can scratch out a tolerable existence. Changing this process induces an element of uncertainty that as far as he is concerned, can just as easily result in decreased as increased production. This margin, however, is the difference between starvation and surplus. He obviously attaches much less weight to increased production than he does to decreased production. Tomboli's figure would put this weight on the order of 1:3.

This risk-aversion probably consists of two components. First there is the chance that in the absence of proper extension facilities, the farmer is uncertain as to the procedures of planting, irrigating, and applying fertilizers. He probably knows this and is consequently wary of applying such fine-tuned technology. Failure to realize the full potential of modern technology can be of disastrous consequences. Whether he obtained a fine harvest or not, he will have to repay the loan he most probably took out to finance the crop, at harvest time. Unfortunately for the farmer, prices are lowest at this time. If the harvest was a good one, the price he obtains is

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* quoted in 9, p. 51.

likely to be low and his final profit equally low. Only the larger, wealthier farmers can afford to hold their crop back until such time as prices rise again.

A final note on the subsistence nature of the economy is lent by the following figures. Only seven out of 29 provinces produced less than 50 percent of their total cereal seeds, and even the one that produces the smallest percentage of its needs (Kabul) still produces some 23 percent of its needs. It has been estimated that only some 45 percent of total grain production moves between provinces (22, p.59). These figures also illustrate the fragmentation of the economy, for grain trade is the largest business in Afghanistan.

In conclusion, the Afghan farmer may be wary to adopt modern agriculture, but his reluctance is based on sound common sense. He does not appear an innately intractible man devoted to antiquated agriculture. He is keen to produce more, but is only willing to do so if it is worthwhile. This does not only mean extremely profitable, but must also carry low risk, and not require much additional effort on his own part. To the Afghan, there are things of equal if not greater importance than material wealth, notably status and respect. While these may be constraints to agricultural development, they must be accepted as part of the social and cultural framework in which development must take place. The most effective means of increasing

production is less likely to be in altering the social structure that it is in exposing farmers to the influences of modern markets and guaranteeing them adequate supplies of credit information, modern inputs and knowledge of proper cultural practices.

## INFRASTRUCTURE

Perhaps the most important cause/symptom of Afghanistan's backwardness is the fragmented nature of the country. With regions within Afghanistan almost as inaccessible to one another as the whole country is to the outside world, development has definitely been hindered. Geographic fragmentation implies social fragmentation, in which identification to village and tribe is more important than the concept of nationhood. Until recently the only real unifying forces were Islam and the common illustrious heritage; the government was regarded as an organization that did little more than collect taxes and recruit soldiers.

With the advent of all-weather roads in the 1950s and 1960s, a great deal changed. The major urban centers were all connected and the movement of goods from one region to another facilitated. Up to this time, little trade took place between regions, let alone with the outside world. As one writer points out, the lack of economic integration resulted in major regional variation in prices. These differences for wheat were as much as 150 percent in 1960 but dropped with increased transportation to 30 percent by 1966.

(U.N., quoted in 9, p.58). However, they are still in the 20 percent range. Exports, imports, and domestic industry and services have all grown rapidly since the main roads were constructed. Clearly transportation was a major bottleneck to economic development.

Roads have not proved to be an unmitigated success, though. As Fry points out, the result has been a competitive advantage to the movement of agricultural surplus to major towns, and even greater disadvantage to its movement to the hinterlands where the wheat deficits have existed. The roads are even felt to have exacerbated the effects of the 1349-50 drought. Thus, roads have resulted in much faster growth for the cities than the rural areas (9, p. 58).

Afghanistan has been unable to capitalize on its main road system by constructing feeder roads to connect the main production centers to the trunk lines. While there exist some 2,400 km of all-weather main roads, there are only 4,280 km of other roads. The ratio of roads per square mile of cultivated land of .217 is one of the lowest in the world. How then, asks Manly, is agri-business to develop (41, p. 199). Agri-business is highly dependent upon farm-to-market roads; the inaccessibility of so many of the farmers and production centers gives them no incentive to increase their production for they cannot market it. It also prevents inputs and modern technology from reaching them. The importance of roads is much

emphasized by Manly's study. He found that in the richest third of the country there were 108 cm/person of roads, while the middle and poorest thirds had only 55 and 28 cm of road per capita (4, p. 199).

Roads are not the only infrastructure lacking. Poor information channels hamper the interchange of commercial information; inefficient and inadequate civil service hinders development; and in many areas even the beginnings of social infrastructure have yet to be seen. As one author said almost 20 years ago:

> "The economic organization of Afghanistan resembles a wide sea dotted with islands of economic activity, each one more or less limited to its own local market, primarily because of inadequate transportation."
> (. quoted in 9, p. 56)

What was written 20 years ago is still almost as valid today.

# PART II

## The Agricultural Development of Afghanistan: What Is Being Done

Part I of this study gave a brief survey of Afghanistan's agriculture, its importance, its problems and its constraints. There is no question about the need to raise agricultural production. As long as agriculture forms the basis of the national economy, this need will remain. Both past and present development planners have recognized this, and consequently directed considerable amounts of development effort in this direction.

The specific path agricultural development is to follow is by no means as obvious as the general need for agricultural development itself. Is agricultural development to center around large-scale infrastructure projects that increase the amount of cultivable land, or should a smaller-scale approach be pursued that increases production through increasing the yields of existing cultivated land? Before this question can be answered with any confidence, a brief look at past agricultural development strategies is in order. Lessons from the past should form an integral part in the present decision-making process. Following this is a brief discussion of the agricultural development strategy currently being pursued and where it is likely to lead. The more that is known of the past and present development policies, the better future policy can be formulated.

Agricultural Development: The Past

Modern development planning began in the mid-1330s (1950s) with the introduction of the First Five-Year Plan. This was followed by two more Five-Year plans that continued until 1350. A fourth Five-Year Plan never really materialized for financial reasons and because of the 1352 coup. There appears to have been considerable reassessment and redirection of agricultural development policies since the 1352 coup; thus the coup would serve as a natural dividing point between past and present development efforts.

As the following table shows, agriculture and irrigation have consistently received a large share of total development outlays.

Agricultural Development Expenditures 1335 - 50

| | | (1) Total Outlays Afs. Billion | (2) Outlays on Agr & Irrig Afs. Billion | (3) As % of (1) |
|---|---|---|---|---|
| First Plan | 1335 - 39 | 10.35 | 1.20 | 11.6 |
| Second Plan | 1341 - 45 | 25.01 | 4.40 | 17.6 |
| Third Plan | 1346 - 50 | 20.72 | 5.85 | 28.2 |

Source: L. Baron, The Water Supply Constraint in Afghanistan, Table 19, p. 223.

In general terms, these development plans were biased towards the creation of economic infrastructure. The First Plan was geared towards ending Afghanistan's isolation through the creation of road and air transportation networks. Agricultural development centered around several large-scale irrigation projects. The Second Plan followed the approach of the First Plan, expansion of

transportation and agricultural infrastructure. The Third Plan (1967-71) showed a shift in emphasis. The priorities were changed from large-scale infrastructure in the transportation and communications sector that realized benefits only slowly, to projects with a short recoupment period in the agricultural and industrial sectors.* It also envisaged a large amount of private investment. Nevertheless, ongoing large irrigation projects like the Helmand, Nangarhar, Parwan and Sadeh projects still consumed major proportions of development expenditures and the Third Plan showed the same poor record as its predecessors in that the poor performance of the economy persisted.

The "infrastructure as a precondition to development" approach that is generally advocated, has in the case of Afghanistan not only failed to be justified, but has, as some feel, become an impediment to the future development of Afghanistan (23, p.16). Afghanistan has lost its isolation, but failed to capitalize on the trunk roads that were invested in at such high cost by building feeder roads. In agriculture, the results were equally depressing. Agricultural output rose negligibly, with most of the increases being in the vegetables and fruits that are exported. Output of other products stagnated or actually declined. Wheat, Afghanistan's most important crop, showed little or no improvement in yields or output over the three plans.

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* Major emphasis was to be placed on the spread of improved agricultural seeds and fertilizers.

Average Wheat Output and Yields 1335 - 1350

| | Average Hectares Sown in Thousands | Average Production in Thousands of M/Tons | Average Yields Tons/Ha |
|---|---|---|---|
| First Plan | 2,213 | 2,187 | .99 |
| Second Plan | 2,243 | 2,159 | .96 |
| Third Plan | 2,132 | 2,216 | 1.04 |

Source: Compiled from Maxwell Fry, The Afghan Economy, Table 3.2, p. 52.

The large-scale irrigation projects that were to reclaim the land and the road systems that would facilitate the movement of goods had no impact in terms of increased commercial output in the agricultural sector. Since these major projects were initiated, particularly the Helmand-Arghandab and Nangarhar ones, many sources feel that there has been a preoccupation with the shortage of water at the expense of improving yields and farm techniques. (23, p.2) The water shortage was felt to be the critical and unique constraint upon increasing agricultural production. However, the benefits from 20 years of investment in large-scale irrigation projects have only been partly realized, and still more investment is necessary before large-scale benefits can materialize.

The large-scale irrigation projects are capital intensive in nature, and fit only poorly into the traditional backward nature of the agriculture they were to develop. As one source says, they exemplify a "classic backward approach to irrigation development. The dams were built first, then attention was turned to the preparation of the land to be irrigated, then to testing the

soils and finally to teaching the settlers how to irrigate." (23, p. 13)

Agricultural Development - The Present

In contrast to the past, present agricultural development strategy is a considerably more diversified process. The agricultural development program of the Republican regime has seven main goals (Kabul Times July 16, 1975).

1. to raise agricultural yields, especially in wheat and animal husbandry

2. to increase foreign exchange and strengthen balance of payments through an increase in export commodities

3. to fix reasonable prices for main agricultural and animal products in the interests of consumers and producers

4. to develop soil and water resources according to economic standards, and utilize these resources effectively

5. to fix areas to be used as pastures

6. to boost animal breeding and production and to improve feeding and protection against disease

7. to reclaim state lands for distribution among landless and deserving families, and land reform

This is obviously a broad-based program. It is too large, for a country with the resources of Afghanistan, to carry out on all fronts on a large scale. Priority appears to be placed upon the increasing of agricultural production

through the raising of yields. While this is, of course, a desirable and justifiable goal, the underlying motivation is somewhat more questionable. It seems that self-sufficiency and to a lesser extent export promotion carry more weight in the minds of those who call for production boosts than does the raising of the rural standard of living. This can be both inequitable and in other cases almost farcical. As shown previously, this can easily lead to major income redistribution between rich and poor, urban and rural. Equally indefensible is the improvement of feeding and the health of animals in a country in which people usually lack the most basic of health services, and often suffer shortages of food. All in all, the feeling cannot escape that the purpose of agricultural development is to provide the cities in particular with a stable, cheap and abundant supply of food than it is to provide the basis for overall economic development.

Agricultural production is to be raised on a nationwide basis through the increased application of improved seeds, fertilizers, and modern techniques. Secondly, output is to be raised through several large-scale regional development projects, notably the Kunar, Paktia, and Herat regions. Were these programs conceived in the genuine interest of the farmers' well-being, one would be much more certain that these programs were reaching the people that needed them most. Both the Paktia and Kunar region border on Pakistan, and the programs have at least partly been conceived to bring

these regions into closer economic contact with Afghanistan. Currently large amounts of trade flow back and forth between these areas and Pakistan, where higher prices usually prevail. The Herat Livestock Development Project was conceived with at least one eye on the lucrative export markets in Iran and the Middle East. The low income levels of the domestic economy will prevent any significant amount of this increased production being absorbed by domestic markets.

Of these three regions in which intensive agricultural development is to take place, only one - Paktia - can be classified in the poorest third of the agricultural population. Manly's study places the largest parts of Kunar and Herat in the upper two thirds of the agricultural population (4, exhibit S.S.0.2, p.205). Thus, only in the case of Paktia is development effort being concentrated in an area that needs it the most. On the other hand, these are all areas in which great potential exists, and which in the national interest are worth developing. Unfortunately, many of the poorest regions that need development the most are also those with the least potential.

The primary means being employed to raise agricultural production (particularly wheat) in Afghanistan is the use of fertilizers, improved seeds, and mechanization. As the following table shows, the use of chemical fertilizers has indeed grown rapidly since they and improved seeds were first introduced during the Third Five-Year Plan.

Use of Improved Seed and Fertilizers 1344 - 53

| Year | Total Fertilizer Consumption (,000 tons) 1/ | Area Under Improved Seed (hectares) 2/ | % of Total Wheat Area |
|---|---|---|---|
| 1344 | 0 | 0 | 0 |
| 1345 | 1.7 | 1,800 | negl |
| 1346 | 3.2 | 22,000 | 1.0 |
| 1347 | 14.3 | 122,000 | 5.2 |
| 1348 | 15.5 | 146,000 | 6.2 |
| 1349 | 22.7 | 232,000 | 10.7 |
| 1350 | 60.0 | 255,000 | 13.3 |
| 1351 | 40.0 | 450,000 | 18.4 |
| 1352 | 44.6 | NA | NA |
| 1353 | 62.5 | 800,000 | 33% |

Sources: Robert Nathan Associates, Planning Study of the Agricultural Sector of Afghanistan, Vol I, p. 74
TVA, An Appraisal of the Fertilizer Market and Trends in Asia, Tables A-8, A-9, p. 117
AFC, 1352-3, Sales Summaries

1/ Figures before 1351 must be regarded with suspicion
2/ Highly suspect, as fertilizer could never be applied to this area, rather at most 150,000 ha. if used at recommended rates

The big push in the use of the improved wheat package came after the disastrous drought years of 1349-50 which realized the country's precarious position. Self-sufficiency in wheat was made a national goal, and is currently the most important aspect of agricultural development.

It is estimated that about one-third of all wheat is produced with improved seeds. This amounts to about 60 percent of irrigated farmland. While improved seed in name, much of it is of poor quality and impure, and

is hardly improved over traditional seeds. Proper seed farms are a necessity if pure improved seed that will fully realize its potential benefits is to be widely used. Currently only 2,500 tons of improved seed are produced of total requirements of 350,000 tons. At least 20 percent of total seed used should be newly produced seed, if the improved seed is not to "degenerate" (10, p.5).

While the use of more or less improved seed is relatively common, the use of fertilizers is not nearly as widespread. On the basis of 80 percent of total fertilizer sold being used for wheat (10 percent for cotton, and 10 percent for fruits, vegetables, etc), and fertilizers being applied at the recommended rate of 75 kg/jerib (387 kg/ha) only about 161,000 hectares of land are farmed to the combined package of improved seed and fertilizer (18).* This land is farmed by less than 10 percent of the farmers. While the improved seeds give slightly better yields if no fertilizers are used, and moderately improved yields with organic fertilizers, the potential of improved yields with fertilizer use (at least three times as much as unimproved seed under identical conditions) is being wasted.

Fertilizer consumption is growing rapidly. Even though a moderate base has now been attained, growth is still occurring in excess of 25 percent annually. This is primarily due to the creation of the Afghan Fertilizer Company (AFC) in 1973. It operates by far the largest and most effective

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* Independent calculations confirm this 80 percent on wheat figure, though the amounts on cotton and fruits, vegetables and sugars appear to be closer to 15 percent and 5 percent, respectively.

retail distribution network in the country. The network currently (mid-1975) comprises 363 retailers in all 26 provinces. It is organized on a decentralized basis, with a head office in Kabul, and regional offices in each of four administrative regions. Map I shows AFC's regional organization. These regions are further subdivided into sub-regions and districts. While good organization has been important, the success stems largely from the incentive offered to retailers. They earn 20 afs/bag sold, which amounts to a 7.5 percent commission on an average price of 10,600 afs/ton. Consequently, more than 80 percent of all retailers have registered sales, the average sale being about 172 tons in 1353 which netted an average profit of about 138,600 afs. The 80 percent figure is extremely good, considering the social and economic environment in which AFC operates. Recently, AFC has started selling other agricultural inputs such as pesticides, spray pumps and smaller farm implements.

The relatively comprehensive nature of AFC's distribution network has done much to ensure that the benefits of fertilizers are available on a nationwide basis. At the same time, 80 percent of the sales going towards wheat has ensured that the relatively greatest number of farmers obtain the benefits. Given the difficult socio-economic environment in which AFC operates, it has probably done as well as possible. Nevertheless, many factors have conspired to result in an unbalanced distribution of fertilizers both by region and farmer type.

Distribution of Fertilizer Sales, and Some Factors Influencing its Adoption, by AFC Administrative Region

| | Percent of Total Irrigated Land (1351) | Percent of Total Fert. Sales (1353) | % of Retail Outlets (1354) | Farmers/Ext. Agent(1349) |
|---|---|---|---|---|
| Region I | 23.0 | 43.7 | 54.3 | 1,100 |
| Region II | 43.7 | 19.4 | 16.5 | 1,400 |
| Region III | 16.1 | 4.9 | 9.6 | 2,400 |
| Region IV | 18.1 | 31.9 | 19.6 | 800 |

Sources: AFC Sales Summaries 1353, Checchi and Company Survey of Fertilizer Warehouse and Transport Requirements in Afghanistan, Table 3, pp. 81-91

Robert Nathan Associates, Planning Study of the Agricultural Sector in Afghanistan, Dec. 1971, p. 50

Simple calculations show the East and South (Regions I and IV respectively) consume proportionately much more fertilizer per acre of irrigated land than do the North and West. There are obviously many factors at work. There is a reasonably close correlation with the number of farmers/extension agents, as well as the number of retail outlets. There are currently only about 3,800 extension agents in the country (10, p.4). In addition to this being an insufficient number, most are poorly trained and insufficiently motivated. There is also poor interaction between research and extension authorities. While the disparities are high (particularly between regions I and II) they appear to be diminishing - in 1352 (AFC's first year), Region I consumed 45.4 percent, Region II, 11.1 percent, Region III - 6.6 percent, and Revion IV - 36.9 percent of total fertilizer sales.

Perhaps the most important factors determining the amount of fertilizer sold are the patterns of land tenure and the availability of credit. Only some 10 - 20 percent of all fertilizer sales are for cash, the remaining 80 to 90 percent are bought on credit made available by the Agricultural Development Bank (ADB) (18). Fertilizer credit is given under favorable conditions. First, the farmer must be recognized as a good, responsible farmer who has lived in the area for many years, as vouched for by the local malik (village head), and secondly, that he has repaid his past loans (if any).

The Agricultural Development Bank is the second vital institution involved in the spread of modern technology. Few farmers can afford the cash purchase of inputs, or raise the necessary capital for long-term investments. AFC estimates 80 - 90 percent of all fertilizer sales are on credit. Although originally created in 1333 (1954), it has only recently begun to show successful performance, primarily due to a reorganization, and UN assistance that provided an expatriate management team. From 1333 to 1349 its performance (1954-1970) steadily deteriorated. A total of afs 225 million were lent, and by 1349, afs 91 million were still outstanding. In the year 1347, only 15 loans were made totaling only afs 5 million, and 1348 performance was even worse (25, p. 10). The success of the rehabilitation program is shown on the following table that shows ADB lending since 1349.

ADB Loans 1349 - 1353 in Afs Million

| | 1349 | 1350 | 1351 | 1352 | Est. 1353 |
|---|---|---|---|---|---|
| Production Loans[1] | - | - | 46 | 60 | 89 |
| Fertilizer Loans[2] | - | - | - | 252 | 339 |
| Investment Loans[3] | 22 | 43 | 119 | 60 | 110 |
| Agribusiness Loans | - | - | 49 | 26 | 11 |
| Marketing Loans[4] | - | 3 | 4 | 20 | 208 |
| TOTAL | 22 | 46 | 218 | 418 | 757 |

1. Primarily to cooperatives
2. Before 1352 made by extension service
3. Tractors, water pumps
4. Cotton (?) financing

Source: IMF, Recent Economic Developments in Afghanistan, 1975, Table 2, p. 5.

On the basis of the above, loans are expanding at a rate of about 80 percent annually.

About half of the amount loaned was for the purchase of fertilizer. These short-term fertilizer loans are made by "flying squads" that visit the regions from the 14 regional branches of the ADB, for a few days each year. There are currently about 120 people engaged in this scheme. For the 1355 crop year this arrangement will be improved; squads will spend the whole of the planting season negotiating these loans thus ensuring that farmers not in the immediate vicinity of the towns will have access to the loan agents. Most loans are made to groups composed of at least five farmers who are collectively responsible for the repayment of each of the individual loans.

The interest rate is 10 percent with a 1 percent payment penalty if the loan is not repaid within one year. Medium-term loans are primarily made for farm equipment including pumps and tractors. They carry an interest rate of 8 percent, repayable within five years. Long-term loans are primarily for orchard development, and minor irrigation works. They also carry out 8 percent interest rate, and orchard loans enjoy a 3 - 5 year grace period (14, pp. 4-5).

Despite a substantive improvement and expansion in operations, the scale of the ADB is limited. There are only 10 regional offices that until recently have not had substantial field operations (as witnessed by the staff of 120). Only 46,000 farmers received ADB fertilizer loans in 1353. This is only about 4 percent of all farmers. Assuming a further 1 percent of all farmers pay cash (80 - 90 percent of all fertilizer sold on credit) one obtains a total farmer usage of fertilizer on improved seed of 5 percent.

Such a program cannot be without its income distribution effects on the farmers. Those that use the improved package substantially increase their production, while the overwhelming majority do not. It is now time to look in closer detail at the results and possible path of these policies.

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* About 1.25 million farmers (Agricultural Survey Results)

The Effects of the Fertilizer Expansion Program

On the basis of the preceding data the following so far emerges:

1) If 46,000 farmers purchased fertilizer in 1353, and 85 percent of all fertilizer sales were made on credit, a total of some 54,000 farmers utilized fertilizer. This is perhaps only 4 percent of all farmers (estimated at 1.25 million)

2) If 62,465 tons of fertilizer were sold and used at the recommended rates (87 kg/ha), then 161,408 hectares were fertilized.

3) The average farm size of the farmers who used fertilizer was 3.08 hectares. For the country, this is close to average farm size, but given the large number of small farms, 42 percent less than 3 jeribs, only an exclusive few use fertilizer. These figures confirm earlier impressions that it is the middle-to-upper-income owner-operators of irrigated farmland who are the primary users. The poorer farmers cannot afford, and the wealthier farmers do not wish, to use commercial fertilizer.

As the use of the improved agricultural package has occurred on such a limited basis, there has undoubtedly occurred a transfer of income from those farmers who have not used the improved package to those that have used improved seeds together with fertilizers. This is the same as saying the larger, wealthier farmers who produce for the market have gained at the expense of the poor subsistence or near subsistence farmers. What follows is an attempt to quantify these effects for the years 1351 - 1353.

In the following analytical analysis, certain assumptions necessarily had to be made. Unless otherwise mentioned, the following were assumed:

1) The price elasticity of demand for wheat is - .3
2) The demand for food (wheat) is growing at 3.7 percent annually
3) For projections, a farm price of wheat of 45 afs/seer = 6,368 afs/ton is assumed, otherwise actual harvest prices were used (Saratan-Aqrab average).
4) Fertilizers were applied at the recommended rate of 75 kg/jerib or 387 kg/ha.
5) The yield under traditional irrigated conditions is 1.3 tons/ha, under improved conditions 3.5 tons/ha, or 2.7 times as much.
6) 80 percent of AFC fertilizer sales were used on wheat.

The wheat harvest of a given year consists of wheat that was planted in the fall of the preceding year as well as the spring of the current year. Fertilizer is applied at various times during the season (all DAP and half of the Urea at planting, the remaining Urea at later stages). Consequently, calendar year sales beginning in Hamal (late March) do not correspond to crop year fertilizer sales which begin in Sunbula (late August). For instance, most of the fertilizer used on the 1354 crop was purchased in 1353; only a small remainder in 1354. It is therefore necessary to first rearrange fertilizer sales to coincide with the crop year. Having done this, wheat production can be broken down as follows.

| ar | Crop Year | Total Wheat Prod 000 Tons | Tons Fertilizer Used on Wheat | Improved Wheat 000 Tons | Traditional Wheat 000 Tons |
|---|---|---|---|---|---|
| 51 | 1350/1351 | 2,450 | 38,000 | 344 | 2,106 |
| 52 | 1351/1352 | 2,750 | 48,000 | 434 | 2,316 |
| 53 | 1352/1353 | 2,700 | 46,000 | 416 | 2,284 |

This data can be further broken down to that part of increased production
t was due to fertilizers alone, and what would traditionally have been produced.
the basis of this one can then determine what would have happened to price in the
ence of the increased production.

| ar | Fertilizer Caused Increment to Production, 000 Tons | Base Production 000 Tons | Average Retail Price afs/seer | Price without Extra Product. |
|---|---|---|---|---|
| 51 | 216 | 2,233 | 48.4 | 63.8 |
| 52* | 272 | 2,477 | 38.4 | 52.3 |
| 53 | 261 | 2,438 | 42.2 | 57.1 |

The price farmers receive is traditionally about 7 afs/seer less than the
vailing retail price. On the basis of the above calculations, the following effects
farmers' incomes emerge.

| ar | Farmers who Used Fertilizer | Farmers who Didn't |
|---|---|---|
| 51 | + 96 % | - 24 % |
| 52 | + 85 % | - 31 % |
| 53 | + 88 % | - 30 % |

* The price elasticity of demand was probably greater during this year due to record production.

It proved impossible to account for the fact that a varying amount of fertilized production was justified during the years 1351 - 1353. In 1353, when the precipitation index was a low 74, probably all the fertilized production was justified. On the other hand in 1352 - a year of very favorable precipitation - the index was 120, most if not all of the fertilized production was probably excessive. Since on the one hand it is impossible to determine aggregate needs, and from this determine the excess production; and on the other hand have enough faith in production figures to try compensating by 3.7 percent (both aggregate and year-to-year changes could easily be off by that amount), for growth in demand resulted in these refinements being neglected.

However, even allowing for a considerable degree of statistical error, the results are conclusive. Farmers who used the improved package doubled the value of their produce over what it would have been if they had not used the excess fertilizer (their production increased 2.7 fold, though). Those, who for one reason or another could or did not use it, suffered losses of about 20 percent. The market value of produce, gross farm income or potential farm income, although interesting, fail to reflect the change in the financial situation of the farmer. By neglecting production costs, one has an unrealistic representation of the effect of the program. As the following calculations will show, the picture is exacerbated by a study of the effects on net farm incomes. These effects were calculated on the basis of the following cost matrix.

Irrigated Wheat Production Costs per Ton in Afghanistan*

| Year | Traditional | Improved ** |
|---|---|---|
| 1351 | 5,571 | 3,311 |
| 1352 | 5,571 | 3,450 |
| 1353 | 5,571 | 3,533 |

Source: Derived from USAID, The Feasibility of a National Wheat Management Program for Afghanistan, Table 5-4, p.55

The substantial lowering of production costs combined with increased yields result in a great increase in the net farm income for farmers using the improved package. Other farmers have neither lowered production costs nor increased yields and hence suffer net losses in farm income. The incremental effects of fertilizer usage on farmers' incomes compared to a situation in which no fertilizer was used can be seen below.

| Year | Change in Net Incomes of Farmers who: Used Package | Didn't Use Package |
|---|---|---|
| 1351 | + 195 % | - 89 % |
| 1352 | + 315 % | - 276 % |
| 1353 | + 371 % | - 172 % |

The effects on farmers who used the package are most probably quite accurate; their farms are run in reasonably business-oriented manner. The

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* Constant returns to scale assumed

** Only fertilizer prices were changed from year to year

effects on farmers who used the package are probably quite accurate; their farms are run in reasonably business-oriented manner. The effects on farmers who did not use the improved package are more suspect. Many of these are subsistence farmers who have very few money inputs at all. The costs in these cases represent costs imputed to his own family's labor, seed retained from the last harvest, etc. Hence it is unlikely he loses to the extent indicated.

These effects must be qualified, though. The wealthiest 5 percent of the farmers who produce for the market under improved, irrigated conditions have certainly doubled their income and their net profits. The improved varieites are also quicker-maturing. This will often mean that he can double crop. If he couldn't before, then his income has increased even more. The remaining 95 percent of the farmers will be hurt, but to varying degrees. Worst off

financially has to be the larger dryland farmer. He cannot participate in the improved process, and suffers the full 25 percent loss in income. Moreover it is his crop that is instrumental in determining the size of the harvest. If he has a poor harvest then the price is high, but he cannot participate because his harvest was so small. On the other hand, the farmer participating in the improved process can reap full benefits of the high price; his harvest has not been affected. On the other hand, in years of good harvest the price is extraordinarily low (helped down by improved production), and he loses as the calculations showed, some 20 percent. The direct effects on the subsistence farmer will not be very significant, for by definition he is by and large insulated from market economy. While he may not market a very large percentage of his produce, the amount he does market is important for it provides him with those vital items he cannot produce himself. If the value of harvest declines, the farmer must sell proportionately more in order to purchase these commodities. This will reduce the amount available for his own consumption, but again, he never markets much and will by and large be able to absorb the increased relative price of other goods. This is not to discount these effects, but the real danger lies elsewhere. This process is likely to lock him in his subsistence world. He will never be able to break out of subsistence if prices are falling, and agricultural policy and the economy neglects him to the benefit of larger producers. The jump for him from

subsistence to market farmer is going to become harder and less possible as time and current agricultural development policies progress.

While the fertilizer program helped solve a food shortage that is probably more important in the short run thatn the income effects just described, it cannot be continued indefinitely. The more farmers that adopt these modern techniques, the smaller are the benefits to those who have adopted them. At some point long before all farmers have adopted modern practices, it will become unprofitable. The drop in price induced by the additional production, together with high production costs will be sufficiently large to offset the increased production. At this point, all farmers lose -- those who haven't increased production because the price has fallen, and those who haven't increased production because the price has fallen, and those who have becaus they caused the price to fall sufficiently.

The following brief analysis shows this point. The following additiona assumptions were made:

7) Total Improved Production Costs = 12,702 afs/ha (adapted from 29, p.
8) Total Returns = (3.5 tons/ha) x 6,368 afs/ton) = 22,290 afs/ha
9) Net Returns under traditional irrigated techniques
   = 8,278 - 7,243 = 1,035 afs/ha. (adapted from 29, p.55)
10) Base production level constant, i.e. dryland harvest constant from year to year, and area under wheat cultivation constant.
11) No effective wheat stabilization program operates.

The first farmers to use the improved package obtain the full 22,290 - 12,702 = 9,588 afs/ha profit. Subsequent farmers using the improved package lower the wheat price, and decrease the profit of the earlier farmers as the following shows.

If 10 percent of the farmers use improved techniques, total production increases by (.1)(2.7) + .9(1) - 1.17 = 17 percent.

Assuming population and incomeeffects increase demand by 3.7 percent, excess production is 13.3 percent.

Price decreases by 3.3 (13.3 percent) = 44 percent to 25 afs/seer

Returns per hectare decrease to 12,355 leaving profits of -347 afs/ha.

Thus if only 10 percent of all farmers use the improved techniques, all farmers have suffered. The break-even point under these assumptions is the point at which the change in price induced by increased aggregate production is exactly equal to the change in profits from the maximum 22,290 to the point of zero profits 12,702 or - 43 percent.

X = percent of farmers who use the improved techniques.

P = Price of Wheat

Q = Aggregate Production

$Q = 1 + 1.7X$

$P = (1 + 1.7X)(3.3) = 3.3 + 5.61X$

Balancing, $3.3 + 5.61X = -43$ $\quad 5.61X = 39.7$

gives $\quad X = 7.08 \quad P = 26$ afs/seer

On the above, average production would be about 3.1 million tons.

Thus if 7.1 percent of all farmers use the fertilizer at the recommended rates and obtain the possible yields, they gain nothing. This percentage in reality probably lies above this. Most farmers do not farm effectively enough to gain 3.5 tons/ha and many observers believe that farmers apply fertilizer more thinly than recommended rate. If one changes the productivity increase factor from 2.7 to 2, and performs the same calculations, this figure changes to 12.0 percent. There are also the effects of dryland harvests. A poor dryland harvest would reduce aggregate production and increase price. This will increase the profits of farmers who use the package, or alternatively allow increased numbers to profitably use it that year. A good dryland harvest would have the opposite effect. Again, accuracy is questionable, but the fact does emerge that only a small percentage, perhaps only 10 percent, will be able to employ the improved package and still make a profit. At break-even prices for these farmers, dryland and traditional irrigated farmers are already incurring substantial losses. All this, of course, assumes the absence of an effective wheat price stabilization program.

The lot of the poor farmer is the worst. In years of good harvest, he loses because everyone has a good crop, and the price is low. In years of poor dryland harvest, it is probably he who is experiencing the poor harvest, and has little or nothing to sell now that the price is high. The wealthier farmer whose improved crop is large and stable, gets wealthier in these poor harvest years, while the wealthy dryland farmer can afford to ride the bad year out.

Currently 5 percent of the nation's farmers are using fertilizer on wheat. At the rate improved wheat production is spreading (about 25 percent annually, if one goes by the rate of increase of fertilizer usage), the break-even point of 10 percent could be reached in four years' time, or in 1358.

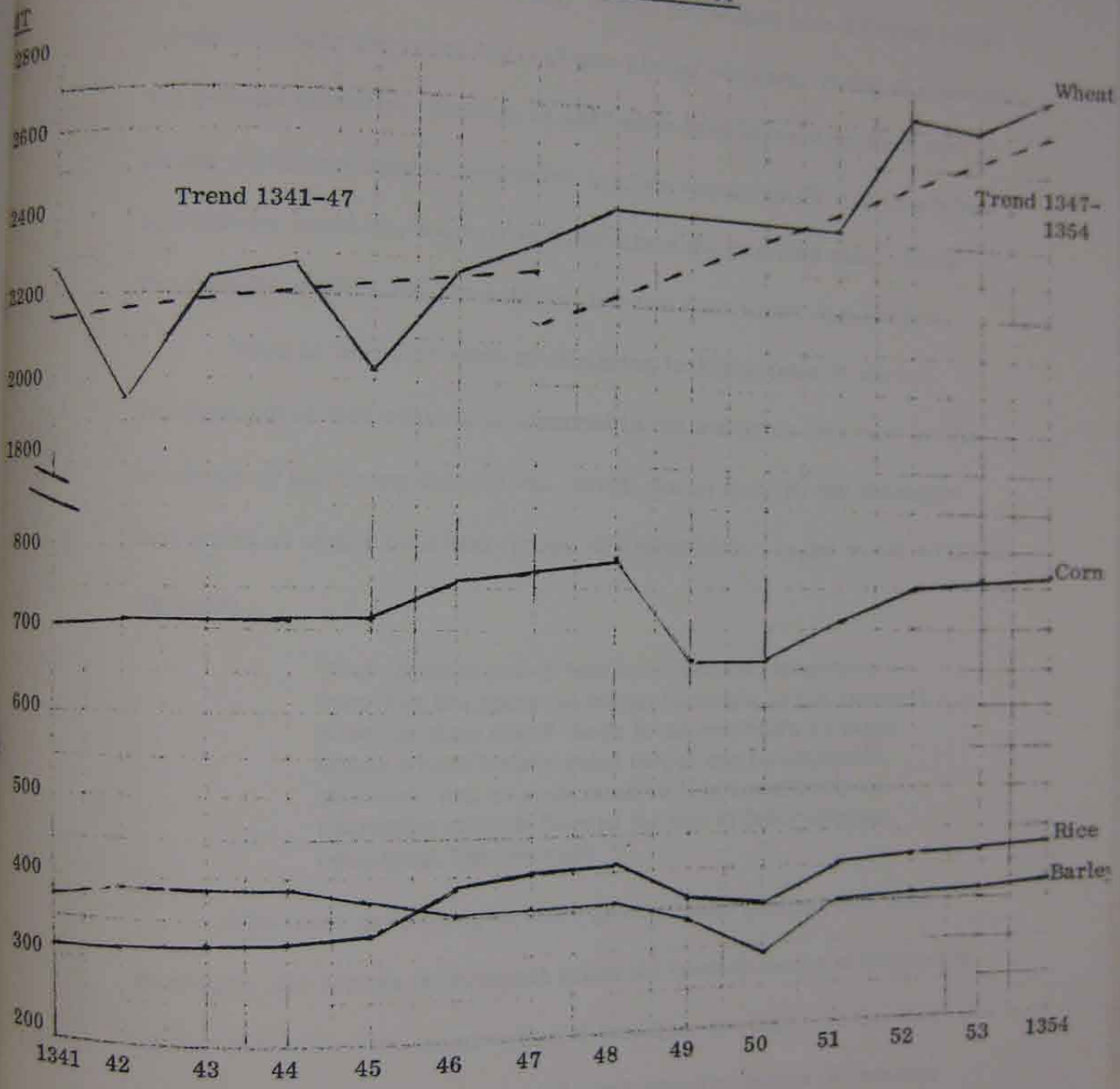
Conclusion

What emerges from the preceding is that indiscriminate increasing of wheat production is potentially harmful. While in the nutritional interests of the nation, it is not conducive to broad-based equitable development. Farmers represent a mass of decentralized decision makers who on their own will elect to produce more wheat, and give the previously described results. It is therefore imperative that agricultural development be a centrally coordinated process that allows all the farmers to benefit.

Afghanistan faces a dilemma, though. It needs the additional food production, otherwise it would not have pushed fertilizers. The drought years of 1349-50 proved this conclusively. Hence the Government started the crash fertilizer program. The time has come, though, to de-emphasize it since a base of self sufficiency has been reached. The precipitation index in 1349 and 1353 were comparable (74), yet wheat production in 1349 was only 2,081 thousand tons compared to 2,700 thousand tons in 1353. There were obviously other factors at work, but much of the increase must be attri buted to fertilizers. There is the prospect of very large wheat crops in the near future, perhaps too large.

The following graph puts wheat production in historical perspective:

Cereals Production 1341 - 54



The production of corn, barley, and rice displays almost no increase in trend production at all. Wheat production is a different story. Production over the years 1341-47 was almost stagnant, rising at a meager 1.1 percent annually. Starting in 1347 when fertilizers were first used on any significant scale, production has increased rapidly - at an average 3.4 percent annually, more than three times the previous rate. Since the drought of 1349-50, the rate has been an even higher 3.8 percent.

What is in the process of occurring in Afghanistan is all too reminiscent of that which has occurred in the countries that were on the forefront of the Green Revolution. Much can be found in the literature that could so easily be a description of Afghanistan. In the words of David Turnam:

> "Government policy has been directed largely to securing the potential output increase in the shortest possible time which leads to an emphasis on large farms where commercial output can be expanded quickest, and to a permissive if not positively encouraging attitude toward the use of labor-saving equipment like tractors."

Like most developing-country governments plagued with food shortages, the Afghan government chose the easiest means of increasing wheat production - the improved seed-fertilizer package. In the short run it was the quickest, least costly and most effective means of inducing additional food production. It required little government effort apart from the acquisition and distribution of the inputs, and some rudimentary

extension in a few select areas to provide the desired increase.

This fits an equally typical mold, described by J.K. McDermott:

> "A country faced with an urgent need for increased production of a single important commodity may want to buy only the diffusion of a standardized technique. Such diffusion can be facilitated if the technique is accompanied by other elements, such as credits to buy the needed inputs and price supports. This type of operation resembles that of a firm, and extensioners involved in it are, in a sense, package salesmen."

The severe drought of the years 1349-50 justified the immediate concern for increased wheat production. Almost any means was justified. However, unless there are to be severe adverse income distributional and economic development effects, a considerable reassessment of this program must be undertaken. It is with this subject that the final section will address. The continuance of the program as it stands reflects priority concern for an adequate, cheap supply of wheat for the urban sector, and only somewhat late, if at all, an interest in the raising of the incomes of the majority of the small, poor farmers.

# PART III

Part I of this report studied the comprehensive nature of the food and agricultural problems facing Afghanistan, while Part II suggests that even more serious problems could arise if agricultural development through increased food production is not managed correctly. How then is agricultural development to proceed? Two questions are involved here. First, from a national perspective, what crops should be emphasized the most, and to what markets should these crops be directed. Even the most equitable and comprehensive of agricultural development programs cannot succeed if it is producing the wrong produce for the wrong markets. The second question relates directly to the importance of agriculture in the overall process of economic development; the fact that besides GNP per capita growth, economic development means equitable income distribution, productive employment, and an attack on poverty. This means the pattern of agricultural development is at least as important as the process itself. The means by which agricultural development is to proceed is hence the question the second part of this section will address.

## What Crops for Whom

Of paramount importance to this question is the limited ability of

the domestic economy to absorb increased food produce. Food production growth in excess of 3.7 percent, the rate which demand appears to be growing, cannot be absorbed without an attendant drop in price. In fact, food production for the domestic market results in a direct conflict between consumer and producer interests.

The more food production is increased relative to demand, the worse off the food producers will be, due once again to the inelastic demand for basic foodstuffs.* There is thus the paradoxical situation of increased food production harming the farmer. This is unfair to the farmers, but similarly, failure to increase food production is unfair to consumers. As long as food production increases as fast as demand, neither party gains or loses. This may be fair, but no one is gaining very much, particularly the farmers (his income rises by only the increased percentage sold). Consequently, an economy of such low purchasing power is going to have to look elsewhere for a basis for growth. This means agricultural production for export, either directly or preferably through agro-industries, will have to serve this purpose. Policy so far appears to recognize only the foreign-exchange-

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* The two critical assumptions made here are:
1) costs of production have not dropped by more than price; and
2) increased domestic production is not substituting for imports, i. e. the country is self sufficient.

creating aspect of exports, as it emphasizes the increased production of foods for domestic use, and equates this with sustainable agricultural and economic development.

Having established that agricultural production for export holds the key to economic growth, the question then becomes what crops. The crops that Afghanistan currently produces (or almost produces) in surplus, and can thus be qualified as exportable are wheat, cotton, fruits and vegetables. Afghanistan's scarcest and most limiting factor is irrigated land. Ranking the export value of produce per hectare of irrigated land places fruits and nuts products highest, followed by cotton, wheat and vegetables. However, before conclusive statements can be made, cropping patterns should be investigated.

In the north and the south of the country in areas of sufficient year-round water supply, two major crops a year can be grown. There is a fall planting season and a spring planting season. The fall crop is almost invariably wheat; few other crops (some vegetables and barley) can survive a winter under snow-covered ground, the winter conditions of the North. In the South, winter weather is considerably milder and other crops can be grown. However, partly because of age-old subsistence traditions of growing wheat, and government emphasis on wheat production, wheat is still almost exclusively grown. If the wheat is harvested quickly (a little earlier than optimal), and another crop quickly sown, a second crop is possible provided

there is enough water. The land in the center of the country is too high and has insufficient water to permit double-cropping. Kabul is much the same, although other quick-maturing crops like vegetables are often grown. Land cropped to sugar beet does not permit double-cropping. Typical double-cropping patterns (fall/spring) are wheat followed with cotton, mung beans, corn, melons, or rice. The effect of double-cropping on farmers' income is significant. Although neither crop yields as much as it would if it had been grown on its own, together they give a significantly higher income.

The climatic conditions and cropping possibilities can have an important effect on the possibilities for improved crop management. First, wheat is the only significant crop that can be grown in the fall/spring season in the northern regions. There is no threat to wheat production in these regions, as there is no feasible alternative. As these regions produce almost all the wheat that enters the national market (Helmand, Herat, and the Southwest are the others), the wheat production base appears secure. And given the momentum attained in the fertilizer program, these regions alone could continue to produce the nation's marketed wheat. Cropping patterns in the south, particularly HAVR*, could thus change to crops more suited to the milder fall/winter season. Existing double-cropping patterns

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*HAVR stands for Helmand Arghandab Valley Region

can, therefore, by and large be retained, and in certain cases improved. This means finding new and better combinations, for regions like the HAVR, and improving the patterns in others. The two cereal crops produced in many regions are particularly soil-depleting. Of all double-cropping patterns, wheat-cotton brings the best returns. At a later time, when a proper feedlot (perhaps in conjunction with the Herat Livestock Development Program) program has been introduced, farmers would also find it profitable (as well as good for their soil) to grow legumes and other soil-restorative forage crops.

In regions that cannot double-crop, emphasis should be placed on that crop that earns the most on its own. A single harvest of fruits yields more on its own than any other crop, and many double-cropping patterns. What is more, many forage crops can be interplanted, giving the same effect as multi-cropping. Orchards thus make an ideal choice for that irrigated land that could only be single-cropped anyway.*

Significant emphasis has been placed upon cotton production in recent years. Being a widely grown crop (grown in at least 10 provinces), its export benefits a significant number of farmers, and is thus a relatively equitable crop to emphasize.** The problem with cotton production is

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* This may not apply to some fruit crops like grapes or pomegranates that grow or are grown close to the ground.

** The most equitable crop in this sense to emphasize would be wheat, but Afghanistan seems to be a relatively high-cost producer of wheat and would do better emphasizing fruits and cotton, which fetch higher prices and require more labor (and give a higher return to labor).

marketing; most cotton produced in Afghanistan is short-staple, which, while in strong demand does not fetch as high a price as long-staple cotton. One extremely profitable channel for research would be the development/ adaptation of long-staple varieties.

Fruit products, although not as extensively grown as cotton or wheat as a cash crop, are the products in which Afghanistan probably has its greatest comparative advantage. An FAO viticulturalist, M. Jelaska, said that of all the grape-growing countries he had seen, none had the potential of Afghanistan. Yields in Afghanistan are almost as high (12,000 kg) as in California which has the world's highest yields, and this without the benefit of modern techniques, equipment, and fertilizer. The quality, he said, was superior to anything sold in Europe. Other fruits, particularly melons and store fruit thrive in the hot, dry, sunny climate of Afghanistan.

There are several major constraints though. First, orchards require a long gestation period, and farmers are reluctant to sacrifice immediate benefits for future ones, as their interim existence is usually very much dependent on the foregone crops. This has hopefully changed with the advent of Agricultural Development Bank orchard loans (see part II). And in addition, minor crops primarily forage legumes can be

grown on the same land during the gestation period.

Despite agricultural bottlenecks that appear easy to overcome, exports to the highly profitable markets of the developed nations will not be easily increased.* This is because the major constraints are hardly agricultural in nature; these being the subsidiary services of packaging, grading, preserving, and international marketing. The large disparities between Afghan and world market price show the problems the country faces in marketing its produce abroad. There are signs that these are being overcome, and several development assistance organizations have expressed interest in these fields. However, significant improvements in these fields will have to be made before the potential of exporting fruit products to the developed market economies, Europe in particular, can be realized. This is not only true for cotton and fruit exports, but true also for karakul skins. Deficiencies in these fields have been instrumental in the relative decline in Afghanistan's position in the international karakul market.

The chances of any rapid reallocation of farmland are slight. No farmer feels secure unless he produces a wheat crop, particularly if he is in an isolated area. Thus, wheat will continue to be the winter crop in most of the country for a long time to come. Only at such time as sufficient

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* Exports of grapes (fresh and dried), though, have been growing at 6% yearly, but these have been to Eastern European nations and India in the main.

production (which probably exists now) and good distribution and marketing facilities exist (which lie farther in the future) will some regions, HAVR in particular, be able to devote increased cropland to noncereal products. (Maximum obtainable wheat yields in HAVR are only some 60 percent those obtainable in the North.) If and when such specialization is achieved, it has been estimated that only about one million hectares would need to be devoted to wheat production to produce 3 million tons of wheat. Currently some 2.5 million tons are produced on 2.5 million hectares. However, this would require a five-fold increase in the use of fertilizer on wheat.

In the short run, the largest gains for the future have to lie in the improved subsidiary services, and it is in this direction that the most effort should be directed. There is presently an excess of production over domestic demand and exports demand that has driven domestic prices extremely low. This hurts the farmers; an improvement in international marketing, difficult as it is, would provide the best economic returns. Concurrently, the government should start using the country's natural resources more effectively, by encouraging the areas best suited to particular crops to concentrate on them. Then, as the economy becomes more integrated and wheat supplies in particular more dependable, regions

will find themselves able to grow those crops that they best grow. This will not only help prevent the tendencies of an intensive nationwide wheat program discussed in Part II, but actually improve farmer incomes by having fewer farmers involved in domestic food production, and more in exports. In terms of export goods, though, it appears as if Afghanistan has, in cotton and fruits, found its best products. Livestock, too, is a good export, considering the pastoral nature of much of the population and large amounts of land suitable only for grazing. This natural resource is in the process of being exploited by the establishment of a Herat livestock project. Although primarily export-oriented, it can easily help satisfy increased domestic demand at such time. The government must, however, be more strict in preventing the widespread encroachment of dry-farmed land on grazing land.

How Should Development Proceed

The preceding section neglected or assumed away the issue of income distribution; however, it is now time to tackle it. The recommendations that evolved concentrated on Afghanistan's prospects from a national and regional perspective. One cannot say that this is wrong, for the country as a whole has only a limited supply of resources at its disposal and wishes to make the most of them. In the national interest, it makes no sense to use

resources inefficiently, particularly when failure to develop areas of hig potential has a multiplier effect on the performance of the whole economy. So, unless policies and funds are directed in some perverse manner that favors low-potential over high-potential regions, growth will be disproportionately high and low, depending on the region. Specifically, the farmers of the North and South will always find themselves at an advantage relative to those in the East and Center.

While the issue of equitable income distribution cannot be neglected, it seems that no matter how comprehensive, regionally balanced, and egalitarian development policies are, growth is unlikely to proceed on an egalitarian basis if only because the conditions under which farmers operate vary so much throughout the country. And if a program of export promotion is introduced, one will likely find that only those farmers with good irrigated land, and access to markets for inputs and produce will find themselves able to participate in the process. So, in addition to inter-regional differences, one also has to contend with interpersonal differences.

What then does this mean. Obviously, total egalitarianism is as impossible as it is unrealistic, despite being a social ethic. Yet it is obvious that unless income redistribution measures are undertaken, growth will never approach an egalitarian basis. To the extent that the government is

concerned with income distribution, its measures to correct the inequities are crude and inefficient, and stifle economic activity. Consider the problem AFC faces (24). Many of its distributors make in excess of Afs 100,000 from selling fertilizer. The government disapproves of this and attempts to rectify the situation by establishing more retailers in the same area. The result of this is harmful to the agricultural development process, for no retailer has the same incentive to increase sales and the use of fertilizers, etc. that the original one had. The only efficient means to affect income distribution is through progressive income taxation. This would not only mitigate interregional, but also interpersonal differences. Obviously, an effective income tax is a long time coming, particularly in rural areas. At the moment the criticality is lessened by the disintegrated regional nature of the country, but it must be realized that only through fiscal and tax policies will all types of income disparities ever be overcome. But for agricultural development policy, egalitarian growth will have to start with the assumption that it is infeasible to have interregional equality unless economic efficiency is to be sacrificed.

The question that lies central to Afghanistan's agricultural development is how production can be increased. In recent years, following the disillusionment with large-scale irrigation projects, this question has come

more and more to mean how can yields be increased and particularly in the short-run time horizon. Large-scale irrigation is not the answer, even though it may well be the ultimate one. Intimately associated with this question is whether these yield-increasing schemes will guarantee an equitable income distribution. The present fertilizer-improved seed-mechanization program obviously cannot. For a variety of reasons, few farmers gain access to the new technology, and because of their limited numbers, reap large benefits. At the same time, the poorer farmers suffer. Some may lose their land as operations are mechanized, while all suffer the lower prices the increased production has induced.

Before any recommendations are made, a close look at the critical factors is necessary. One source (18) has identified eight factors, and ranked them as follows:

1) Farmers' incentive
2) Available water
3) Cultural practices
4) Improved seed
5) Technical assistance
6) Pest control
7) Fertilizer
8) Government subsidies

Although an arbitrary ranking, fertilizer was ranked next to last by a man in the business himself. All points except 5 and 6 will be discussed in more or less detail. Pests are not a critical problem in Afghanistan, and technical assistance is beyond the scope of this paper.

Farmers' incentive involves two factors; first, the land tenure system and secondly, price incentives. As discussed previously, land tenure patterns may or may not be short-run constraints to production. If all it takes to increase production is extra labor on his part, sharecroppers will probably invest the extra labor for additional product, considering he needs all he can produce. Certainly it is a constraint to fertilizer adoption; he foots the cost himself and receives only half the crop, the half of the crop that would only just pay back the cost of the improved package. Thus, if fertilizer were the key, land tenure patterns would certainly be a disincentive; however, in the absence of fertilizers the effect of land tenure patterns is not clear (see Part I).

The effect of land reform is equally dubious, considering the system envisaged. The ceilings are:*

1) 20 hectares for irrigated farmland, double-cropped, or in orchards.

2) 30 hectares for irrigated farmland that is single-cropped.

3) 40 hectares for dry-farmed land.

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* Source: Kabul Times, August 23, 1975

Few holdings of irrigated farmland are over 20 hectares, so in this category very little land would be redistributed. Dry-farmed holdings are much less productive than irrigated ones, and holders of 40 hectares of dry-farmed land would find themselves earning perhaps 1/4 - 1/5 the amount of a farmer who double-crops his holding of irrigated land. This is quite inequitable, the limit on dry-farmed land being disproportionately low. This policy is also in direct conflict with the declared push for mechanization, farms have to be at least 40 hectares large for tractors to be economical.

The effects of land reform, as envisioned, on production would be minimal. While in the interest of social justice, little redistribution would result, apart from the breaking-up of a few semi-feudal estates. In areas of smaller holdings that are sharecropped, it could even create more truly landless, as owners take over production themselves and retain the original share croppers as farm laborers.

The second component of farmers' incentive is price incentives. Afghan farmers have shown themselves to be quite price responsive, as cotton-wheat shifts in response to the previous harvest's cotton-wheat price ratio has shown. Cotton production has jumped greatly in the last few years in response to higher purchase prices, with yields increasing as well.

Sugar beets show the same response, but to a lesser extent, while fruit exports were shown in Part I to be quite elastic. The big problems here are not at the farmer level, but at the marketing level, particularly abroad.

Currently, the greatest bottlenecks to increased production are available water, and backward cultural techniques. The water supply constraint refers not to the large-scale irrigation project sense, but rather to the guaranteeing of sufficient water at the right times to presently irrigated land, and the construction of new small-scale projects to irrigate presently dry-farmed land. This means primarily the improvement of existing structures. There is much water loss from existing structures, and in many cases intakes and conduits need to be reconstructed annually as spring floods wash them away. Quite often this reconstruction has to be done at the time when the land needs the water the most. The returns to these projects have been shown to behhigher than for large-scale ones; they are also easy to implement, and yield immediate benefits. By opening dry-farmed land to water has already at least doubled farmer incomes, and if double-cropping is possible, increased it by even more, often at very low cost. It is odd though that most small-scale irrigation schemes are done by the Rural Development Department and not the Water and Power

Authority (WAPA). This obviously shows a failure to recognize priorities.

Another most critical constraint is backward agricultural practices. The land is still by and large cultivated in the same way that it was centuries ago, and yields have hardly improved. Yet there is enormous room for improvement in this field. In fact, experiments done using traditional seed with proper cultivation practices, such as timely planting and harvesting, proper irrigation, and weeding have obtained yields of 100 seer of wheat per jerib. These are the same yields currently obtained through the use of the improved seed-fertilizer package. Many of these practices are simple, requiring no extra cost and little extra effort. Timely planting and harvest are within everyone's means, as is weed control. But weeds are "cultivated" as animal fodder, and little do they realize if the weeds were removed, the additional produce could easily purchase the same amount of fodder. Planting could be improved: planting at the correct depth and in rows could save considerable seed over traditional broadcasting techniques and improve yields.* Many of the old practices are quite ingrained, and will only improve with time. As it is, however, little or no attempt is being made to improve them. It is apparently easier to adopt new techniques and perpetuate the old ones, than to change the old ones. But it is precisely in the improvement

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* The expanded use of organic fertilizers is also well within the means of most farmers.

of cultural techniques that the greatest benefits lie, not in the adoption of new technologies. It costs nothing to adopt proper cultural practices apart from additional labor. It costs some 5,000 afs a hectare to adopt the modern technology and obtain the same yield. Obviously, the return on proper cultivation is much higher, both financial and to labor. Only few farmers can afford to adopt a fertilizer-seed package, yet everyone can follow better farming practices. Emphasis on proper agricultural practices would also do much to lessen the growing income disparities the present scheme is creating, as well as cost the country no additional foreign exchange.

Obviously, if the farmers knew the best farming practices, they would follow them; the trouble is they don't know them, neither does anyone else. This is the task the research stations should be put to work at, and which the extension agents can spread. As can be seen in Afghanistan though, the major force in the spreading of agricultural knowledge is not so much the extension agent but the farmers themselves. While an improved, enlarged, and more motivated extension service is a necessity, it is not by itself the prerequisite for agricultural development. Another task in this field research center should concentrate on is the testing and development of improved-yield seeds that do not require a special irrigated land-fertilizer package.

The fertilizer program will have to be viewed in its proper perspective. It will have to stop being viewed as a substitute for improved cultural

practices, water supplies, and everything else that has contributed to agricultural development, but rather as a factor that augments them, that takes over when other means have been exhausted. It was this pattern that agriculture followed in the developed world, chemical fertilizers were the last step in agricultural development. In Afghanistan, they were the first.

An ultra-fine-tuned process has been transplanted to a country in which 90 percent of the people cannot read or write. It is only because realizable gains are so much higher than what is obtained that the brute-force, inefficient campaign works. Consider the following:

1) The application rates are the same the country over, whatever the crop. This just has to be inefficient; depending upon crop and region different amounts of fertilizer must be optimal. It is not beyond the ability of the farmer to apply at different rates.*

2) The application rate is too high. Fertilizer displays diminishing marginal returns at non-insignificant application rates. This means the more that is applied, the more production increase, but with increasingly smaller incremental increases in production per unit increment in fertilizer application. Consequently, if fertilizers were applied at lower rates, greater aggregate production would result.** High application rates made sense when only very few farmers used fertilizers, and wheat self-sufficiency was a critical issue, but not anymore.

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* Although the rate of 3 bags/jerib is very easy for farmers to follow.

** Halving application rates would increase improved wheat production almost two fold (29, Table S-1, p. 52), if same total absolute amount fertilizer were applied.

Lowering fertilizer application rates could be dangerous. If the released fertilizer were used on wheat, prices would fall by even more, and hurt farmers more. If this were to be the case, rates would be better not reduced. However, now that a satisfactory wheat base has been achieved, emphasis could be diverted from wheat, and more fertilizers applied to export crops. Doing this and lowering application rates would result in slower wheat production growth in the future and benefit the farmers. Lower application rates would also make fertilization cheaper, and more accessible to small farmers. Finally, if urea usage continues to increase at 25 percent, then domestic production capacity (currently 105,000 tons) would be reached by 1358 (1979-80). Lower application rates could help postpone this date.

3) The application rates are arbitrary. DAP is an extemely sensitive chemical that must be applied with precision if it is to be fully effective. Given the crudities of application procedures (as well as broadcasting as means of application) it is doubtful whether DAP is having its intended effect; certainly some is wasted.* The ratio of DAP to urea could certainly be lessened without any significant effect on production, experts feel. This is significant as urea is domestically produced, while DAP has to be imported a high world prices (although on USAID loans).

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both are necessary to improve

* It must be mentioned though that limited fertilizer trials indicate yields significantly, and the current ratio of 2:1 urea DAP cannot be increased very much before yields drop.

4) Urea is produced domestically at about 3-4000 afs/ton, but is sold at about three times that price. It more than subsidizes DAP imports. If the government were particularly concerned with the ability of all farmers to afford fertilizers, urea in particular, it would sell it at a lower price. However, in the absence of an income tax, the high price of urea and DAP does act as a form of taxation on its use, as compared with cost-pricing.

As one can see, the fertilizer program has cut all the corners. Only by the high potential gains, and the relative fool-proofness of the process has it been successful. Nevertheless, the fertilizer program is here to stay. Not that I advocate its abolition; on the contrary, it has probably served its purpose well, and better than any alternative in the short run. It has created self-sufficiency in wheat production. However, it is now time to reassess it before it gets out of hand. It is time to realize that it is not a panacea for agricultural underdevelopment. It is time to tackle the age-old problems that have plagued agricultural production, and show no signs of disappearing on their own. Imported technology may continue to be introduced until eternity, but will never reach its full effectiveness until the first very basic problems are tackled -- inadequate water supply and poor cultural practices. The best, cheapest, and most effective means this country has to increase agricultural production is to alleviate these constraints. While effective in their own right, they will also enable

increased numbers of farmers to use and purchase fertilizers. Fertilizers should come to be regarded as a means to extend good agricultural practices, and not as is currently done, substitute for them.

Often the two go hand in hand though. If fertilizer and seed were planted correctly (fertilizer 1-inch below seed), yields would improve significantly (30). This is not to forswear all mechanization. On the contrary, selective labor-augmenting mechanzation (threshing operations, for instance), could considerably improve operations and in many cases, allow double-cropping. Once again though, more gains are to be had through the use of hand implements than machines, seed/fertilizer drills for instance.

As mentioned before, absolute equality is impossible. Some farmers will always be better off than others, and will always be in a better position to care for themselves, by selling when the price is highest, being able to buy fertilizers, etc. It is the poor farmers who will continue to suffer most, and even though policy will be aimed at helping them, find it hardest to raise their incomes. Most of these farmers are wheat producers for subsistence, who sell the odd sack at harvest time. If the intensive wheat program continues, then farmers are likely to find themselves getting relatively if not absolutely poorer. In the interests of these poorest farmers then, an effective price support program for wheat is necessary. This could be either part of a

comprehensive wheat stabilization program, or simply government buying and selling in the bazaars to stabilize the price.

The government's Food Procurement Department currently guarantees farmers 45 afs/seer for wheat delivered to government storage facilities, but farmers rarely receive that. The system is riddled with corruption and inefficiency. Even in the record harvest year, the highly touted procurement program procured only two fifths of its projected 200,000 ton goal, despite market prices falling well below the support price. The difficulties are reminiscent of those the old ADB had. Considering the success an expatriate management team has had in reorganizing that institution, there is no reason why the same could not be done for a wheat stabilization program.

The country desperately needs an effective wheat management program. The excessive swings in year-to-year production, and hence prices, alternately hurt the farmers and the producer, and face the country with a fluctuating supply of wheat, the staple food. Although little is known about the wheat storage capacity of the private sector (believed to be in the 200,000 - 300,000 ton range), it appears on the basis of price data, to do a reasonable job of evening out the supply over any one year. It does not appear to even out year-to-year supplies. Such a program would even out the year-to-year fluctuation in production and prices, and hopefully preclude the need for future wheat imports.

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* Perhaps government anti-hoarding laws play a role in this.

The secondary benefits could be very attractive. With a functioning stabilization program, increased dryland could be farmed to wheat, and reduced irrigated land, without fear of a poor dryland harvest badly upsetting supplies. This would allow the released irrigated land to be released to more profitable crops, and help foster the specialization of agriculture, particularly in the interregional sense discussed in the first section of this part. The additional physical investment in this program would not be great, about 225,000 tons of good storage already exist (of a projected need of about 420,000 tons), and the internal rate of return on such a program has been conservatively estimated at 18 percent (29, p. 22) or more.

Conclusion

The following is a brief summary of the conclusions reached in this paper:

1) Afghanistan does not suffer a major shortage in food production. Per capita consumption of all basic foodstuffs is well above subsistence levels. The problems in food production are those of dependence upon imports of certain vital commodities, and those of excessive variation in year-to-year production for weather reasons. Now that an adequate base in cereal production appears reached, some form of wheat stabilization program is both feasible and necessary. The food deficits

in sugar and oil both show signs of lessening due to increased cotton production (for vegoil production), and the increase in domestic sugar production and intention to enlarge the sugar processing capacity even though from a purely economic viewpoint this may not be the most efficient use of economic resources. There is now no need to greatly emphasize food production; production can easily increase in line with demand, and given that average consumption appears adequate, it is perhaps best to simply let the natural market demand for food bring about future improvements in consumption and nutrition.

2) Having established that agriculture must provide the basis for national economic growth, that the domestic market for food has only limited additional absorption capability, and that there is no overriding nutritional reason to push food production for domestic consumption, more emphasis can be placed on the production of high value export crops. Of these, the most desirable would be those such as cotton that could be processed by domestic agro-industries. These would increase the domestic value added, stimulate other sectors of the economy, and have stronger income multiplier effects throughout the economy.

3) How then is the agricultural sector to be developed, in a way that is both consistent with rapid economic growth on a national scale, and equitable income distribution. It was shown that the improved seed-fertilizer mechanization program as currently being implemented is not consistent with the second aspect in particular, and that a concentration on the more fundamental constraints including proper agricultural practices and adequate water supply would do much to instigate this development. Despite high economic returns on fertilizer, even greater ones were to be had in this field. The fertilizer program then should be reassessed in the light of results of part II, and the recommendations of part III. What this amounts to is that Afghanistan should try to develop and utilize its existing natural resources of land, climate, and water as effectively as possible, and not try to compensate for their under-utilization through imported technology.

4) Above all, it must be realized that agricultural development is a time-consuming process, and that it cannot grow indefinitely on its own without a concomitant expansion and modernization of the rest of the socio-economic framework in which it occurs. Only with this will come a true specialization and intensification of agriclture, and

a rapid growth in agricultural incomes. Being a late-comer to the development process, Afghanistan feels it has to catch up at any cost. Little do they realize that by staying one step behind and proceeding at the same pace, they are in the unique position to learn from their predecessors' mistakes, which in the long run will certainly leave them better off.

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