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Edited by

**Csaba Csáki
Theodor Dams
Diethelm Metzger
Johan van Zyl**

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THE LAPIS PROJECT (LESOTHO) IRRIGATED VEGETABLE PROGRAM: IMPACT ON HOUSEHOLD ECONOMIES

N E Artz

INTRODUCTION AND METHODS

The USAID-funded Lesotho Agricultural Production and Institutional Support Project (LAPIS) began in 1986 with the goal of increasing income and employment in Lesotho's agricultural sector to offset decreasing domestic productivity and increasing dependence on insecure remittance income. The project's purpose was to develop the capability of Lesotho's Ministry of Agriculture, Cooperatives and Marketing (MOACM) to support increased commercial production of high-value crops, livestock and livestock products among the nation's small farmers. Increased horticultural production was viewed as a key objective, and the irrigated vegetable program was the main vehicle for achieving it.

The program initially entailed provision of production credit through a sub-component designed to develop and capitalize the existing network of local credit unions, development of appropriate cropping programs, assistance in input procurement, and direct technical support to participating farmers in production and marketing. These efforts were supported by associated programs in agricultural research and education.

The project design stipulated working with small farmers establishing individual enterprises and small production and marketing associations. When the technical assistance team arrived late in the 1986-87 cropping season, eleven individual enterprises had already been set up with petrol pumps, sprinkler systems and basic cropping programs, so technical support was required immediately. This was provided largely by the expatriate team with support from available Ministry staff. During that initial season, additional applications for support were reviewed on the basis of experience to date with the initial group of farmers, and 19 individuals and two associations were selected for support beginning in the 1987-88 season. The associations were already organized with financial support from other sources and were looking for viable types of production to undertake. Their combined membership was initially 55.

Through the 1987-88 season, the Project and Ministry technical team worked closely with participating farmers to develop their production and marketing skills, refine the technical package and generate effective selection criteria for future participants. A number of applications were reviewed, and enterprise plans for those selected were developed. However, constraints were becoming evident in the areas of production credit, marketing and Ministry support, the last due in part to a shift in MOACM policy away from the small-farmer emphasis upon which the program was based. In light of these constraints, it was decided not to begin assistance to any new enterprises in the 1988-89 season.

Following a mid-term project review in 1989, the program was redirected: the target numbers of enterprises to be established were eliminated; the level of direct farmer support by the expatriate team was tapered off and dropped completely by 1990; and the overall effort was refocused to address the identified credit, marketing and Ministry manpower constraints for the duration of the project. LAPIS is scheduled to end in May 1991.

Annual surveys were conducted to provide the data required to assess the impact of the

The LAPIS project (Lesotho) irrigated vegetable program

irrigated vegetable program on participating households as an aid to effective implementation and monitoring. Data were collected in two rounds between August and November 1988, covering the 1986-87 and 1987-88 cropping seasons, and again in September and October 1989 for the 1988-89 season. All participating individual producers and association members were interviewed. This report describes some notable results of preliminary analyses, particularly in the area of household income and expenses. In addition, the survey solicited information on household composition, impact on food consumption, impact on household labor allocation, impact on traditional cereal cropping and livestock husbandry, and on participants' perceptions of the technical package. The annual surveys and periodic reporting will continue to monitor the performance of this pilot effort.

The results reported here indicate the effect of the program on the income and expenditure of participant households and the larger issues of program impact which can be indirectly assessed on the basis of these variables. The general effects desired were:

- an increase in income from the sale of produce;
- a concurrent decrease in income from off-farm employment, particularly migrant labor, indicating an improved perception of agriculture as a primary occupation;
- increased household investment in agriculture (e.g. inputs and agricultural services) and in "quality-of-life" expenditures such as food, fuel, clothing and school costs; and
- a cumulative increase in total household income and expenses resulting from the above shifts.

It should be noted that only rough, summary statistics are reported. In most cases, these are group means with large standard deviations and small N-sizes which should be interpreted cautiously.

RESULTS AND DISCUSSION

Several salient indicators drawn from the survey data which bear on the desired program impacts identified above, are summarized in the following tables. The selection of variables to be included was based on the strength of their association with the desired effects or on their value in explaining changes occurring on other, more directly pertinent variables.

Table 1 deals with the 11 initial households with individual vegetable enterprises established during the 1986-87 cropping season. There is no pre-intervention baseline for this group; the reported changes indicate shifts among the first, second and third years of production.

Reported income from sale of fruit and vegetables, the income variable expected to increase most directly as a result of the program, increased by 40 percent from the first to the second season, indicating a significant improvement in production and/or marketing across this group during their second year. However, income from this source fell by 47 percent in the third season for a cumulative decrease of 26 percent. These shifts were accompanied by a 70 percent decrease in income from men's migrant remittances followed by a 152 percent increase for a cumulative decrease of 25 percent. In addition, mean income from wage work of men in Lesotho rose by 51 percent in the second year and by 234 percent in the third year for a net increase of 404 percent. The reported changes in mean income from field crop sales roughly parallel national averages, reflecting variation in climatic and physical conditions. These shifts largely explain the 15 percent decrease in total household income across the three seasons. Mean reported bank balances rose initially by 64 percent then fell by 67 percent for a cumulative loss of 46 percent.

Table 1
Changes in household income and expenses: individual enterprises started
in 1986-87 (N = 11 in 1986-87 and 1987-88, 10 in 1989)

Source	86-87	87-88	Change	88-89	Change	Cum. change
Migrant work of men -						
Mean (M)	1345	400	-70%	1007	+152%	-25%
Standard deviation	2249	917		2650		
Wage work of men -						
Mean (M)	200	302	+51%	1008	+234%	+404%
Standard deviation	447	1002		2231		
Sale of field crops -						
Mean (M)	205	323	+58%	21	-93%	-90%
Standard deviation	222	957		44		
Sale of fruit and vegetables -						
Mean (M)	1458	2044	+40%	1080	-47%	-26%
Standard deviation	564	1561		604		
Total income -						
Mean (M)	4429	3843	-13%	3786	-2%	-15%
Standard deviation	2104	1261		4874		
Purchase of agricultural equipment -						
Mean (M)	111	0	-100%	27	-	-76%
Standard deviation	300	0		84		
Purchase of agricultural inputs -						
Mean (M)	238	156	-34%	260	+67%	+9%
Standard deviation	168	244		156		
Purchase of agricultural services -						
Mean (M)	190	281	+48%	170	-40%	-11%
Standard deviation	241	362		203		
Rental of fields -						
Mean (M)	36	36	0%	30	-17%	-17%
Standard deviation	121	121		95		
School expenses -						
Mean (M)	230	208	-10%	345	+66%	+50%
Standard deviation	271	243		283		
Purchase of household consumables -						
Mean (M)	1198	1269	+6%	1298	+2%	+8%
Standard deviation	798	425		979		
Purchase of clothes and blankets -						
Mean (M)	443	518	17%	503	-3%	+14%
Standard deviation	271	538		501		
Total expenses -						
Mean (M)	3659	3145	-14%	3625	+15%	-1%
Standard deviation	1581	1404		2312		
Balance in bank accounts -						
Mean (M)	368	605	+64%	199	-67%	-46%
Standard deviation	408	893		255		

In terms of agricultural expenditures, the trends are mixed. Mean equipment purchases fell 100 percent initially then recouped somewhat in the third year for a cumulative decrease of 76 percent. Input purchases appear somewhat brighter in that the initial 34 percent decrease was countered in the third season by a 67 percent increase, for a net gain of nine percent. Agricultural services, which include, most importantly, hired labor and equipment repair, initially gained 48 percent then fell back by 40 percent to generate an 11 percent decrease over the term. Mean expenditure for field rental remained static for the first two seasons, then fell by 17 percent.

All the "quality-of-life" expenditures rose across the three seasons, though mean school expenses took a minor dip from 1986-87 to 1987-88. Cumulative increases in expenditures for school, household consumables, and clothes and blankets were 50, 8 and 14 percent respectively. After an initial 14 percent drop in mean total household expenses, this figure rose by 15 percent for a net decrease of one percent.

The overall situation indicated by these figures is rather bleak. While vegetable production continued to contribute substantially to total income, these farmers seemed to be turning increasingly to off-farm employment options, and mean total income dropped across the term. The general trend in investment in agriculture was downward, while mean "quality-of-life" expenditures were marginally up. The most likely explanation for these trends is that this group, in general, is not committed to this type of production, a conclusion backed up by program field personnel who have observed that a number of the initial group of farmers gradually stopped working on their vegetable enterprises as the level of direct extension support was reduced. These individuals pulled down the mean figures reported here when some of their peers were committed and doing quite well. This scenario should not be surprising given that the technical package was untried and that no participant selection criteria were in place when these initial enterprises were established.

The individual farmers who began producing in 1987-88 present a different picture, as indicated by the figures in Table 2. Mean produce sales jumped by 1 048 percent in their first year of production to constitute half of the mean total household income. Income from this source fell back by 11 percent in the 1988-89 season, resulting in a cumulative gain of 923 percent. Off-farm income of men fell across the board for the term, by 47 percent for migrant work, 50 percent for wage work of men in Lesotho and by 95 percent for casual work in Lesotho. Mean income from wage work of women, on the other hand, increased dramatically in the first year and finished this period up by 555 percent. Mean income from the sale of field crops fell radically in the first year of vegetable production but rebounded substantially in the second for a cumulative decrease of 63 percent. It should be noted that the rebound in the 1988-89 season occurred when national field crop production was far below average because of inclement weather and a cutworm outbreak. Mean total income increased by 19 percent from the pre-intervention season to the first year of vegetable production, then by eight percent from the second to third season, for a net increase of 21 percent. Mean bank balances fell marginally initially then gained 117 percent to finish up by 81 percent.

Mean expenditures for agriculture finished the term substantially up in all areas, particularly for purchase of equipment, where the increase was 2 280 percent. Input expenditures also climbed after an initial drop to end the period up by 125 percent, and investment in agricultural services, including vital hired labor and equipment servicing, climbed steadily to finish up by 230 percent. Likewise, mean expenses for rental of fields

Table 2
Changes in household income and expenses: individual enterprises started
in 1987-88 (N = 19 in 1986-87 and 1987-88, 20 in 1988-89)

Source	86-87	87-88	Change	88-89	Change	Cum. change
Migrant work of men -						
Mean (M)	1047	619	-41%	550	-11%	-47%
Standard deviation	1894	1617		1612		
Wage work of men in Lesotho -						
Mean (M)	788	500	-37%	394	-21%	-50%
Standard deviation	1840	1172		964		
Wage work of women in Lesotho -						
Mean (M)	88	547	+522%	576	+5%	+555%
Standard deviation	385	2119		1696		
Casual work of men in Lesotho -						
Mean (M)	689	23	-97%	36	+57%	-95%
Standard deviation	2751	63		135		
Sale of field crops -						
Mean (M)	431	4	-99%	161	+3925	-63%
Standard deviation	1478	14		417		
Sale of fruit and vegetables -						
Mean (M)	237	2720	+1048%	2424	-11%	+923%
Standard deviation	471	1757		1804		
Total income -						
Mean (M)	4485	5351	+19%	5801	+8%	+21%
Standard deviation	3872	3187		5220		
Purchase of agricultural equipment -						
Mean (M)	5	0	-100%	119	-	+2280%
Standard deviation	21	0		447		
Purchase of agricultural inputs -						
Mean (M)	116	78	-33%	261	+235%	+125%
Standard deviation	116	106		286		
Purchase of agricultural services -						
Mean (M)	122	365	+199%	402	+10%	+230%
Standard deviation	184	396		448		
Rental of fields -						
Mean (M)	23	97	+322%	175	+80%	+661%
Standard deviation	11	413		183		
School expenses -						
Mean (M)	411	308	-25%	627	104%	+53%
Standard deviation	467	349		1324		
Purchase of household consumables -						
Mean (M)	1326	1558	+17%	1602	+3%	+21%
Standard deviation	1608	1043		679		
Purchase of clothes and blankets -						
Mean (M)	622	340	-45%	489	+44%	-21%
Standard deviation	583	286		576		
Total expenses -						
Mean	3182	3965	+22%	5243	+32%	+65%
Standard deviation	2018	2427		3647		
Balance in bank accounts -						
Mean (M)	510	467	-8%	923	+117%	81%
Standard deviation	567	467		2695		

increased each year for a cumulative jump of 661 percent, probably resulting from the efforts of a couple of the most successful farmers to radically increase their base of production.

"Quality-of-life" expenditures generally increased across the three seasons, though there were some decreases from the first to the second. Mean school expenses finished up 53 percent, purchase of household consumables up by 21 percent and purchase of clothes and blankets down by 21 percent. Mean total household expenditures climbed steadily for a net gain of 65 percent.

The performance of this group differed significantly from that of the initial individual enterprise farmers, basically attaining all of the desired objectives of the program. Their vegetable production efforts were economically successful, replacing income from off-farm sources for a net increase in total household income and a contribution to increased savings. Investments in agriculture increased substantially, and income from field crop sales was apparently rebounding after an initial drop. A substantial part of the income generated was expended to increase the households' standard of living.

All in all, this group seems much more committed to agriculture and more willing and able to use the support offered by the program to make agriculture pay. Whether the higher level of performance of this group over the initial 11 farmers is attributable to improvements in the technical support package, to the development and application of basic participant selection criteria or to serendipity is not clear, but it certainly indicates that the individual enterprise aspect of the program can work, at least within the limits of the setting in which it was implemented.

Table 3 focuses on association member households, all of which began producing in the second season covered by the survey. Here, the major income source which should have been most directly affected by the program was wage work of women and men, as that was how most of the profits generated by the vegetable enterprise were distributed. For women, the majority of the members, this figure climbed by 107 percent in the first year of production and by 42 percent in the second, for a net gain of 194 percent. For men, mean income from this source fell initially by 15 percent then climbed by 98 percent to finish up by 69 percent. A number of men in the households of female association members were hired casually during the first production year; the rough reversal in trends for wage work of men and casual work of men between the three seasons may reflect increased interest on the part of men in working more regularly with the association. Casual labor of men ended up by 79 percent through the term. Mean income from men's migrant work fell initially by 14 percent then increased by 35 percent for a net increase of 16 percent. Income reported for sales of fruit and vegetables increased substantially (550 percent) in the last year. Presumably these sales were from home plots rather than from the association. Some direct profit distributions to members were made during the second and third years, but they seem to have been missed by the survey's breakdown of income sources.

A particularly interesting feature of this profile is the decrease in income from sources generally favored by disadvantaged women such as brewing (down 49 percent), handicrafts (down 75 percent), hawking (down 95 percent) and other casual employment (down 69 percent). These women apparently gave up the other small-scale commercial activities to pursue their work for the association. Trends in field crop sales again roughly parallel the national pattern. Total income increased steadily to end the period up by 44 percent. Bank balances fell after an initial gain to end down by 44 percent.

Table 3
Changes in income and expenses: households in associations started in
1987-88 (N = 55 in 1986-87, 54 in 1987-88 and 50 in 1988-89)

Source	86-87	87-88	Change	88-89	Change	Cum. change
Migrant work of men -						
Mean (M)	673	579	-14 %	781	+35 %	16 %
Standard deviation	1533	1533		1713		
Wage work of men in Lesotho -						
Mean (M)	151	129	-15 %	255	+98 %	+69 %
Standard deviation	469	374		855		
Wage work of women in Lesotho -						
Mean (M)	251	519	+107 %	739	+42 %	+194 %
Standard deviation	877	1166		1535		
Casual work of men in Lesotho -						
Mean (M)	58	206	+255 %	104	-50 %	+79 %
Standard deviation	254	1015		346		
Casual work of women in Lesotho -						
Mean (M)	54	9	-83 %	17	+89 %	-69 %
Standard deviation	190	40		117		
Sale of field crops -						
Mean (M)	56	141	+152 %	41	-71 %	-27 %
Standard deviation	328	634		110		
Sale of fruit and vegetables -						
Mean (M)	15	16	+7 %	104	+550 %	+593 %
Standard deviation	56	58		410		
Home sale of joala, beer and food -						
Mean (M)	235	54	-77 %	119	+120 %	-49 %
Standard deviation	596	171		316		
Sale of handicrafts						
Mean (M)	44	12	-73 %	11	-8 %	-75 %
Standard deviation	124	78		66		
Hawking -						
Mean (M)	86	6	-93 %	4	-33 %	-95 %
Standard deviation	381	46		26		
Total income¹ -						
Mean (M)	2315	2707	+17 %	3335	+23 %	+44 %
Standard deviation	2695	4166		4466		
Purchase of agricultural equipment -						
Mean (M)	0	1	-	47	+4600 %	-
Standard deviation	0	10		153		
Purchase of agricultural inputs -						
Mean (M)	41	28	-32 %	56	+100 %	+37 %
Standard deviation	85	73		118		

(continued)

Table 3 (continued)

Source	86-87	87-88	Change	88-89	Change	Cum. change
Purchase of agricultural services -						
Mean (M)	52	40	-23 %	78	+95 %	+50 %
Standard deviation	123	90		120		
School expenses -						
Mean (M)	112	282	+152 %	225	-20 %	+101 %
Standard deviation	322	730		473		
Purchase of household consumables -						
Mean (M)	1027	1184	+15 %	1368	+16 %	+33 %
Standard deviation	943	1245		1589		
Purchase of clothes and blankets -						
Mean (M)	361	278	-23 %	424	+53 %	+17 %
Standard deviation	419	284		522		
Total expenses¹ -						
Mean	2501	3518	+41 %	4598	+31 %	+84 %
Standard deviation	2975	6470		8280		
Balance in bank accounts -						
Mean (M)	599	684	+14 %	338	-51 %	-44 %
Standard deviation	2425	3148		1067		
¹ Note: These figures are strongly influenced by a relatively wealthy shopkeeper and a principal chief in the Mapholoane Association. When their total incomes and expenses are excluded, these figures become:						
Total income -						
Mean (M)	1923	2054	+7 %	2759	+34 %	+44 %
Standard deviation	1744	2321		3468		
Total expenses -						
Mean (M)	1965	2217	+13 %	3229	+46 %	+64 %

Agricultural expenditures, while relatively small, generally trended up, significantly for equipment, by 37 percent for inputs and by 50 percent for services. "Quality-of-life" expenditures were up across the board, though there were some initial reductions. Mean school expenses, particularly important for this group because of the number of grandchildren they care for, were up by 101 percent, purchase of household consumables by 33 percent and purchase of clothing and blankets by 17 percent. Total household expenses climbed steadily to end up by 84 percent.

Like the individual enterprise farmers starting production in 1987-88, this group apparently made significant progress toward the desired objectives of the program. Increased income was generated and expended in desirable ways, to improve the households' living standard and invest in agriculture. Employment was generated to replace diverse and relatively unstable off-farm alternatives. Given the difficulties the two associations had getting organized to function effectively as groups, this performance is impressive. This conclusion is particularly important given the marginal socio-economic status of the households involved in these associations; their viable options are extremely limited.

SUMMARY AND CONCLUSIONS

The MOACM/LAPIS irrigated vegetable program, through its dual individual enterprise and association approaches, has had an impact upon representatives of two distinct sectors of Lesotho's rural population. The former approach tends to involve mature, male-headed households committed to agriculture and with access to most of the capabilities and resources necessary to undertake commercial production. The latter involves primarily aged female-headed, resource-poor households with little more than the land required to undertake this type of production. These two groups pose different opportunities and constraints for agricultural development which have been recognized by the development community, and the program has generally been successful in alleviating these group-specific constraints to demonstrate a means of realizing the potential of each group to effectively undertake intensive horticultural production.

Changes in Ministry policy regarding development of this type of production occurred as the program was being implemented, resulting in the program's small-farmer, small-enterprise focus diverging from the mainstream approach to such development. However, the program's performance warrants rethinking of this issue on the part of the Ministry, particularly in light of the lacklustre performance to date of the larger-scale model currently preferred.

The evidence of the program's success indicated by this analysis of participating household economies includes:

- across-the-board increases in income from fruit and vegetable sales (manifested primarily as increased wage income for participants in the case of farmers' associations);
- decreased dependence on non-agricultural sources of income for most participating households;
- increased expenditure on agriculture and on improvements to living standards such as education, household consumables, and clothes and blankets in most participating households;
- increased total income and total expenses for most participating households;

Overall, this analysis indicates that both the profit- and employment-generating opportunities anticipated by program planners are real, and that both the individual enterprise and association approaches constitute viable models for small-scale commercial production. These models should constitute an integral component in a comprehensive effort to promote widespread, small-scale, commercial agriculture in Lesotho.