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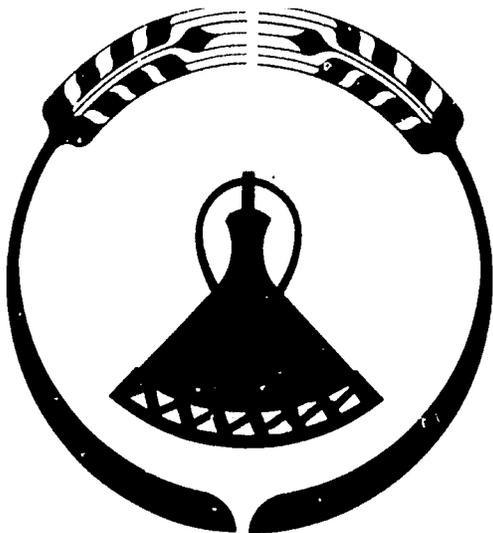
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FARM LABOR IN LESOTHO:
SCARCITY OR SURPLUS?

Ronald A. Wykstra

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**LESOTHO
AGRICULTURAL SECTOR
ANALYSIS PROJECT**

**Ministry of Agriculture
Kingdom of Lesotho
Department of Economics
Colorado State University**

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Lesotho Agricultural Sector Analysis Project

Ministry of Agriculture
P.O. Box MS 24
Maseru
Kingdom of Lesotho

Economics Department
Colorado State University
Ft. Collins, CO 80523

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Department of Economics
Colorado State University
Ft. Collins, COLORADO 80523

LASA Project
P.O. Box MS 24
Maseru, Lesotho

FARM LABOR IN LESOTHO: SCARCITY OR SURPLUS?

by

Ronald A. Wykstra

It is generally thought that in most developing nations of the world, there is a vast underemployed supply of manpower. Accordingly, increased production, improved income and the general welfare depend upon generation of employment opportunities to absorb manpower. In the case of Lesotho the labor surplus thesis may be in error.¹

At the risk of belaboring the obvious it is clear that of all factors needed to develop the agricultural sector, manpower is a critical input. Improvements in erosion control, fertilization, or seeds will have a limited effect in increasing agricultural output if manpower shortages prevail. This is true whether labor scarcities exist in absolute terms, in a socio-economic context, or in a managerial sense. The possibility of shortages amidst labor surpluses is the basic contention of this paper.²

The observable (and unfortunate) facts in Lesotho in recent years include a reduced level of crop farm output, declining crop yields,

¹This type of error can have a significant impact upon other issues, such as the desirability of labor vs. capital using technologies, industrial vs. agricultural sector emphasis, or anthropological-social transformation vs. basic economic changes. Any thesis that has become so universal a truth as has the labor surplus doctrine should be questioned, for such truths have been known on occasions to mask more reality than they reveal.

²The data analysis and conclusions which follow must be regarded as very tentative and probabilistic in nature in that the absence of adequate information has necessitated "guesstimates" in far too many instances.

increased amounts of fallow land, and increased migrant labor. Table 1 summarizes the decline of Lesotho's agricultural sector during the last quarter of a century -- a period of time during which the population increased by one-half million persons. However, planted acreage decreased by some 200,000 arable acres; total crop production is now less than one-half the levels formerly reached; gross crop yields are about one-half former levels; and migrant manpower "exports" to South Africa are nearly four times the level prevailing 25 years ago.

Table 1. Basotho Employment in Republic of South Africa (RSA) Mines and Crop Production Data,^a 1950-1976.

	1950	1960	1970	1976
Gross Crop Production (000 MT) ^a	322	248	190	133
RSA Mining Employment (000)	34	51	87	120
Area Planted (000 acres)	738	797	855	556
Gross Yield Per Acre (200 lb. bags)	4.8	3.4	2.4	2.6

^aMaize, Sorghum, Wheat, Beans and Peas.

Source: Bureau of Statistics, Annual Statistical Bulletins; R.A. Wykstra, Manpower and the Lesotho Economy, LASA Discussion Paper Series No. 7, 1978; and IBRD, Economic Memorandum on Lesotho, 1976.

Declining output, planted acreage, yields, and farm earnings induce human resources to invest less labor in farming today than previously. Traditional farm practices, restrictive relative prices, aridity, and irregularity of rainfall, and soil erosion and infertility also contribute to declines in the crop farm sector. Under conditions of

ever-increasing manpower exports, adoption of improved farm practices and agricultural-development programs are difficult to implement. However vicious this cycle might be, decline cannot be remedied except by having available first an adequate manpower supply, relative to the acreage to be cropped.

In what follows we examine (a) aggregate labor supplies, (b) the labor-income response mechanism, (c) the male labor supply in agriculture, (d) the female labor supply in agriculture, (e) labor demand by farm function and crop, and (f) the "human capital" balance sheet in agriculture.

Supply of Work-Age Human Resources

Table 2 summarizes selected estimates of the active work-age population and labor force by sector of employment in Lesotho (for 1975). The aggregate labor force participation rate 81 percent or some 516,000 persons includes a relatively large female component due to the prominence of traditional agriculture. While an estimated 174,000 Basotho are employed in South Africa on a full-time yearly "level" the aggregate number employed at some time during the calendar year approximates 223,000 persons or 43 percent of the labor force.¹

¹"Level" of employment denotes the estimated number of migrant Basotho employed at any one point in time. In contrast, "numbers" employed reflect migrant workers over an annual period who have, at some point in the year, worked in South Africa. That is, migrant workers who are both (a) in fact employed, and (b) temporarily on home leave even though part of the migrant labor work-force. Needless to say there is a potential for estimation errors in these data. The basis for estimating the number of approximately 49,000 males on home leave (in addition to a level of male RSA migrants equal to 154,000) is derived largely from mining contract and home leave duration information as explained in note (b) to Table 2.

Table 2. Work-Age Population and Active *De Jure* Labor Force Characteristics,^a 1975.

----- (in 000) -----		
Work-Age Population (age 15-59) ^a		
- Male		<u>638</u>
- Female	318	
	320	
Active Labor Force (age 15-59)		
- Male		<u>516</u>
- Female	270	
	246	
Average Yearly "Level" of Employment in RSA		
- Male: Mining		<u>174</u>
- Male: Other	116	
plus	38	
- Female	20	
Aggregate "Number" Employed in RSA ^b		
Number of Males Employed RSA in a Year	203	<u>223</u>
Number of Females Employed RSA in a Year	20	
Number Employed in RSA as % of Active Labor Force	43%	
Number Males Employed in RSA as % of Active Male Labor Force	75%	

^aAdjusted for some 4 percent aged 60-64 from Population Census estimates.

^bThe "aggregate number" employed is estimated on the basis of average mining contract periods relative to average lengths of home stay (see A.C.A. van der Wiel, *Migratory Wage Labor*, Ch. 6). No such adjustments are made for other (non-mine) RSA employment.

Source: Basic data from Bureau of Statistics, and Central Planning Office, Second Five Year Plan, 1975-79.

The aggregate number of males engaged in the Republic of South Africa at some time during a year approximates 203,000 men (165,000 + 38,000). This is three-fourths of all work-age males in the labor market!

Table 3 delineates employment by various economic sectors. All sources of off-farm employment for Lesotho workers (including the number of Republic of South Africa migrant workers) total some 273,000 persons.

Table 3. Estimates of Employment by Sector in Lesotho,^a 1975.

----- (000) -----	
I. ACTIVE WORK-AGE LABOR FORCE (age 15-59)	<u>516</u>
Cash Employment Public Sector	9
Cash Employment Private Sector	19
Handicraft-Traditional Non-Farm Employment	22
A. SUBTOTAL: OFF-FARM EMPLOYMENT IN LESOTHO	<u>50</u>
Aggregate "Number" Employed in RSA (Mining)	168
Aggregate "Number" Employed in RSA (Other Sectors)	58
B. SUBTOTAL: BASOTHO WORKERS IN RSA	<u>223</u>
II. TOTAL OFF-FARM EMPLOYMENT OF BASOTHO WORKERS (A+B or 50+223)	<u>273</u>
III. "RESIDUAL" AGRICULTURAL LABOR FORCE (516 - 273)	243
Plus Gross Male Labor "Availability" from Home Leave ^b	49
IV. AVAILABLE WORK-AGE AGRICULTURAL LABOR FORCE	<u>292</u>

^aLabor force estimates are necessarily crude; however, various sources and authorities are in approximate agreement on the orders of magnitude described herein.

^bAggregate annual availability of male labor on home leave is explained in note (b) of Table 2.

Source: Bureau of Statistics; various IBRD and IMF studies on Lesotho economy; R.A. Wykstra, Manpower and the Lesotho Economy, LASA Discussion Paper No. 7, 1978; and Table 2, this report.

This leaves a residual supply of agricultural labor available fully for farming that is less than one-half the total labor force of 516,000, or about 243,000 persons. However, it is known that those migrant workers (males) on home leave may provide some "available" labor-time. Thus, the total potential labor supply available approximates 292,000 persons as Table 3 reveals.¹

¹Adjustments are made for the likely partial contribution of home leave labor in Table 5 which follows.

Table 4 summarizes the work-age labor force by sex available to agriculture. Whereas nearly 90 percent of all females (some 211,000) are available for some work in the agricultural sector, almost 90 percent of all Basotho males aged 15-59 (238,000) are primarily employed in the Republic of South Africa or in various non-farm activities.

Table 4. Sector of Employment by Sex, 1975.

----- (000) -----			
	<u>Male</u>	<u>Female</u>	<u>Total</u>
TOTAL ACTIVE LABOR FORCE	270	246	516
Primary Employment Mining, RSA	165	-	165
Primary Employment Other, RSA	38	20	58
Primary Employment Off-Farm in Lesotho ^a	<u>35</u>	<u>15</u>	<u>50</u>
TOTAL OFF-FARM EMPLOYMENT	238	35	273
RESIDUAL AGRICULTURE LABOR FORCE	32	211	243
Plus Available Males on Home Leave ^b	<u>49</u>	<u>-</u>	<u>49</u>
POTENTIAL AGRICULTURE LABOR FORCE	81	211	292

^aEmployment in traditional-handicraft industries, the public sector and in private enterprise is estimated at a 70/30 male-female ratio.

^bCalculated as explained in note (b) of Table 2.

Source: Tables 2 and 3.

Male manpower available for farming in Lesotho is a residual labor force of 32,000 persons -- augmented somewhat by miners on home leave (estimated as a numerical equivalent of 49,000 workers), who may work some in crop farming. Thus, the aggregate male labor supply "potentially" available for both the crop and livestock sectors of agriculture approximates 81,000 persons. However, this does not imply in any way

that full employment in farming while on leave is a reasonable expectation of the 49,000 men on home leave. The on-site labor force of 32,000 or so men aged 15-59 not employed on an off-farm basis is very small, relative to (a) some 900,000 arable acres of fragmented cropland, and (b) 3+ million head of livestock in Lesotho's agricultural sector.

The Farm-Labor-Income Response

There is no doubt that farm production can be increased as current farm technological and management practices are improved upon in Lesotho.¹ To the extent that present development projects are oriented toward these goals (and an adequate labor supply in agriculture exists), one could expect improvements in crop yields and output. However, if labor scarcities and/or inadequate returns to farming are a problem, developmental progress in agriculture can be stifled. It is worthwhile at this juncture to digress briefly into income-earning matters. Simply put, cropland farming may not be worth the effort today in Lesotho--over and above the issue of not being feasible in terms of present manpower supplies.

A note on "equality". One often encounters in Lesotho the assertion that income and wealth are relatively equally distributed. Thus, by implication, it would appear that development projects need not be concerned with income distribution impacts.

¹ Among measures that have a potential for successfully attacking the problems today are projects that: improve upon input and output distribution; emphasize progressive farmers; concentration upon Class I, II, and III lands (some 680,000 acres), etc.

In fact, however, this may not be the case if select sample survey data from area projects are reasonable indicators of income distribution as of the early to mid-1970's. It appears, for example, that in the Thaba Bosiu region about one-third of the poorer farm household (FHH) population receives some one-eighteenth of all income, whereas at the upper extreme some one-third of FHH receive nearly two-thirds of all income.¹

<u>% of FHH</u>	<u>% of Income</u>
29	5.5
41	31.7
30	62.8

Indeed, at the uppermost extreme seven percent of all farm households received nearly one-fourth of all income--or about as much as the poorest one-third of all farm households. Not surprisingly, the distribution of tools and livestock (two primary forms of wealth holdings) also are reflective of the above noted maldistribution of income. John Gay, for example, has noted (again in sample survey data) that about one-half of all farm households owned 0-1 livestock units and about two-thirds owned no farm tools.²

¹Data on income distribution are constructed from the Thaba Bosiu GES study for 1973/74 (see: The Income of Farm Households in 1973/74, Evaluation Study No. 1, April 1975, pp. 2-3). For additional information, see A.C.A. van der Wiel, Migratory Wage Labor, pp. 88ff. These data suggest that some one-fourth of all households at the "poverty" extreme receive about 2 percent of total income or R66 per FHH in contrast to the top one-fourth of households receiving about 55 percent of total income or R1,739 per FHH.

²Data are based upon a survey of some 385 FHH (see John Gay, "Rural Sociology Technical Report, " FAO, April 1977, Part II, Appendix).

In short, information of this sort would suggest that the egalitarian assumption often made about Lesotho may be in error.¹ Further, maldistribution of tools and livestock as forms of wealth and income received can impair welfare -- and farming capacity for a significant portion of the Basotho population. A vast proportion of rHH -- most likely without a male head of household present -- subsist meagerly on income levels clearly within the bounds of poverty. While "withdrawal" from the farm-labor force is not an option for such households, low production is, and perhaps even nutritionally constrained labor inputs confront the poor. The crop-farm labor supply response of Basotho workers to relatively high and greatly increased mine incomes or other work options (e.g., food-aid labor) might, however, be characterized as a "withdrawn" farm labor worker effect.

Migrant Worker Earnings. Migrant worker "options" are critical to the withdrawn farm labor effect. Livestock and crop agriculture have constituted less than one-half of Lesotho's GDP in recent years. However, agriculture is a much smaller fraction of the nearly R200 million earned by Basotho workers employed abroad (see Table 5). Indeed, net earnings from migrant labor (i.e., excluding expenditures in South Africa) are more than twice as large as agriculture as a component of GDP, in addition to being greater than Lesotho's GDP itself. During the two years from 1974-1976, cash income alone increased 64 percent for the average miner--an increase more than twice as rapid as miner expenditures in South Africa. A crop farm labor supply withdrawal undoubtedly is influenced by migrant worker earnings.

¹Obviously more detailed research is needed on this matter.

Table 5. Migrant Worker Earnings, 1974-1976.

	1974	1975	1976
Total Earnings Miners ^a	\$ 106.5	\$ 159.0	\$ 182.0
Total Earnings Others ^b	<u>22.5</u>	<u>29.0</u>	<u>35.4</u>
Sum (Millions of Rand)	\$ 129.0	\$ 188.0	\$ 217.4
Average Earnings Miners--in kind	\$ 361	\$ 396	\$ 442
Average Earnings Miners--cash	<u>655</u>	<u>970</u>	<u>1077</u>
Sum	\$1016	\$1366	\$1519
Average Earnings Others	450	500	555
Average Expenditures in RSA--Miners ^c	\$ 463	\$ 533	\$ 598
Average Expenditures in RSA--Others ^c	\$ 180	\$ 200	\$ 223
Net Earnings and Goods Returned (Millions of Rand)	\$ 71.5	\$ 116.4	\$ 131.5

^aBased upon 104,800, 116,400, and 119,800 average yearly employed respectively.

^bBased upon 50,000, 58,000 and 63,800 average yearly employed respectively.

^cSum of in kind and personal expenses in S.A.

Source: Data are from on-going IMF staff working papers such as International Monetary Fund, Lesotho--Recent Economic Developments. SM/77/76 Appendix, Table XII, p. 62.

Thus, agricultural output in Lesotho may be affected adversely by social preferences as well as work options and non-farm income incentives. It is also known that income returns from livestock operations exceed those from cropland farming. Livestock operations involve less manpower input, lower levels of operating costs, and less risk. Livestock

also serves other functions--namely meeting traditional, ritualistic, and private "store of wealth" or saving needs for Basotho workers. It is not difficult to visualize the cultural preferences for livestock vs. crop farming which prevail for the typical Basotho farmer if one keeps in mind such realities. Even if the yield targets contained in present development projects were physically attainable, crop farming is not apt to develop and expand in Lesotho at returns which currently prevail.¹ Gross margins of R12-15 or less per acre as a return to labor and capital inputs--or a wage of less than R1 per manday--cannot attract manpower into agriculture at adequate welfare levels--even if it were available (e.g., via returning miners).

The peasant farmer using traditional methods may well be an unusually rational being, living with those economic realities confronted in his (her) life. Placed in the position of a typical farm household, what combination of economic realities is encountered today in Lesotho?

- (1) There is a probability of crop failure for one reason or another of some 15 percent on the average, even if farm practices are optimal--but it is 100 percent certainty when experienced by an individual farmer.
- (2) There is a high investment cost to crop-farming compared to (a) livestock operations, (b) mining in South Africa, or even (c) food-aid labor opportunities. It is especially attractive to export human capital to off-farm work in the RSA at some R1,000+ yearly.

¹For example, the BASP report projects returns of less than R100 for a five-acre farm (Table 3 of Annex 14).

- (3) Climate aridity may vary but also dictates peak labor demand patterns.
- (4) Difficulties prevail in acquiring tools, other inputs such as fertilizer, access to markets for production, and in some cases land to use for farming.

Any chance to increase net family income several-fold via a prestige line of work (mining) is an obvious best choice. Future opportunities then exist to add to one's capital (via the acquisition of livestock) from having engaged in off-farm work. When fortunate, vis a vis the terms of a mine contract, a male "might" be available to plough on time--or hire it done. And if feasible, again on a timely basis, a partial first weeding "might" be possible. In reality a little, some, or even no weeding will represent the usual investment of female labor--if the land is not left fallow in the first place. Thus, increasingly the Basotho could be expected to decrease land and manpower inputs into cropland farming. Increases in fallow acreage along with decreased and problematic yield and output levels are the result.

Male Labor Supply in Agriculture

Labor may represent a more serious constraint to agricultural growth and development than the "elected" withdrawn labor factors postulated above suggest. We have seen that the total male labor force of work age (15-59 years) in Lesotho numbers some 270,000 men, as of 1975.¹ Even though the number of miners employed in the RSA at any one point in time during a year was 116,000 (1975), the nearly 49,000 males on

¹Data shown in Tables 2 and 3 are estimated from census data and published growth rates.

home leave cannot be regarded as full labor force participants. In the Republic of South Africa miners work six days a week; thus they complete a normal 2,000 hour work year in about nine months. While they may engage in some farm work--family, social and leisure activities will also consume substantial amounts of home leave time.

Generally about three-fourths of all Basotho males, or some 203,000, are employed primarily in mining (165,000) and other sectors (38,000) of the South Africa economy. An additional 35,000 Basotho males are engaged in off-farm work within Lesotho, while still others are involved to a degree in non-crop farming activities in the labor force (e.g., tending livestock). As Table 4 suggested, this leaves a crude estimate of about 32,000 males fully reliant upon agriculture.

Additionally, males at the lower and upper extremes of the 15 to 59 age group are, in certain respects, a low productivity reserve or a "secondary" manpower supply.¹ The productivity and thus human capital value of prime age human resources--say men aged 20 to 49-- is significantly above that of older or younger groups. A variety of conditions such as failing health, semi-retirement (perhaps after decades of mining), needs for schooling and lower "non-prime age" levels of productivity are recognized attributes of younger and older workers. Studies have shown that the age range 20 to 49 constitutes over 85 percent of all male migrants to South Africa. One might well conclude "...that there is

¹ Mining employment requires a minimum age of 18 years and only a very small portion of miners are over age 50. Hence the 32,000 full time male farm workers are, in all likelihood, disproportionately represented in age extremes 15-18 and 45 or 50+ years of age.

almost no permanent core of able-bodied male labor in Lesotho" for agricultural production.¹

Some portion of the time of the male labor supply including home leave migrants will be spent on livestock related activities. Management of over 3 million head of livestock is not left completely to older men and herdboys under age 15. Also, by tradition, Basotho males are oriented more to livestock and less to seriously conducting crop farm tasks (a lower status or female-perceived job). Each of the nearly 190,000 farm households (FHH) in Lesotho has, on the average, virtually one male employed in South Africa. Thus decision making or actual FHH head status is accorded to females for approximately 70 percent of all Basotho farms.² Additionally, one cannot neglect the potential negative productivity effect of nutritional inadequacy as it relates to productivity for some (i.e., the poorest) proportion of the male labor force component. It is reasonably clear that chronic nutritional deficiencies prevail for some one-fourth of all children under age five and, while such nutritional deficiency is in all likelihood smaller for adult males, it can affect work-time and productivity adversely. Lastly, there are the crop farm income disincentives due to being landless, having to sharecrop and rising and relatively high mine earnings as was noted earlier. Taken as an aggregate, and recognizing that population census data and labor force estimates are subject to relatively wide margins

¹A.C.A. van der Wiel, Migratory Wage Labor, pp. 32-33. Van der Wiel also observes that "...men available between contracts are usually not very involved in farming."

²Bureau of Statistics, 1970 Census of Agriculture.

of error, it is likely that no more than 81,000 male workers (aged 15 to 59) are available for "some" crop farming in Lesotho.¹

Generally speaking, what evidence is available indicates that miners employed in the RSA tend to average about 25 to 30 percent of a year on home leave, but not necessarily at the time when needed to perform male defined farm (plough-plant) tasks. Arduous mine laboring conditions and long hours as well as nominal returns to farm manpower relative to wages in South Africa only serve to strongly discourage miners from farming. That the miner returning home briefly elects to devote time to non-farm matters is an understandable, rational decision. The full time work equivalent component of the "home-leave" male farm labor supply is considerably less than the 49,000 shown in Table 3--particularly since most migrant workers on leave have earned a full work-year (or more) of wages far in excess of what might be earned in crop farming.

In short, it is not unreasonable to identify male manpower engaged full time in crop farming at well below the 81,000 level (32,000 + 49,000 men on home leave), let us say something on the order of 40,000 to 45,000 manpower units.² This estimate takes into account the known

¹This upper range estimate is consistent with studies conducted by van der Wiel (*ibid.*, p. 16) who delineates 28% of the male labor force as "engaged" in agriculture but makes no adjustments for agricultural work time.

²Typically, one finds in census and area survey statistical studies that 50 to no more than 60 percent of all FHH heads report farming as a "primary" occupation. If something like one-third this population is male, this suggests also that only some 32,000 male manpower units can be regarded as the full time equivalent male farm labor supply. In short, some 45,000 full farm equivalent male labor units appears to be a reasonable mid-point approximation of male manpower available for farming. Essentially, the estimated 49,000 "home leave" males are regarded here as some 13,000 full time worker equivalents. Hence male agricultural manpower supplies = 32,000 + 13,000 = 45,000.

offset factor of male miners returning and working periodically, but it does not reflect the peak load labor demand characteristics of agriculture. Ignoring that factor for now, the functional farm labor supply most likely approximates about one functional male manpower unit per 20 arable acres of cropland.¹

The supply "range" of probable mandays in terms of arable acres (land/labor ratio) and in terms of aggregate mandays per year is shown in Table 6. Data on mandays for male agricultural labor are shown on both a 250 and 300 manday basis yearly. Other authorities² have reckoned upon 200 mandays per work-year, however, the larger supply estimates are used here to avoid understating peak load labor supply available for crop farming. In short, these estimates suggest that the total male labor supply available for crop farming approximates 1.0 million mandays or less per month, or some 12 million mandays yearly. A male agricultural labor input of this size doing timely plough-plant farm function on 900,000 acres of arable land may well be inadequate, as we shall see in our analysis later.

¹Based upon an estimated 900,000 arable acres cropland.

²IBRD, Report of the Migrant Workers Re-Employment Mission, 1975. Annex IX.

Table 6. Estimated Millions of Man Days Male Labor Supply in Agriculture, 1975.

	Labor Supply Range		
	High 50,000	Mid 45,000	Low 40,000
Mandays Labor Supply Per Year (millions) ^a	15.0	13.5	12.0
Mandays Labor Supply Per Year (millions) ^b	12.5	11.3	10.0
Arable Acreage/Male Labor Ratio	18.1	20.1	25.1

^aBasis 6-day work week (300 day year).

^bBasis 5-day work week (250 day year).

Source: Tables 2, 3 and 4.

Female Labor Supply in Agriculture

There is a traditional division of labor between the sexes in Lesotho, and it has been strongly influenced by the growing number of migrant male workers this past decade. While every one of some 190,000 farm household has a migratory worker on the average, there nevertheless are a large number (about 40% or 75,000 of all farms) without migrant labor incomes. This is consistent with still another important phenomenon concerning female labor: a large proportion (at least 30%) of all farm households are headed by socially recognized widowed, divorced or separated females.¹ In all likelihood, an even larger portion of Basotho

¹Van der Wie, ibid., pp. 34 and 86; and Bureau of Statistics, 1970 Census of Agriculture.

farms are headed by females in an unpublicized single or deserted status. From those data available, about 70 percent of farm households are managed by women.¹

Women typically remain at home directing domestic activities as well as supervising farming. Such women are normally required to perform all basic decision making and operating procedures in farming, except perhaps, primary activities related to large livestock and the plough-plant operation. Additionally, Basotho women are more highly educated on the average than are men (due largely to the large number of male herdboys), and commonly are employed in agri-related and government positions. Women thus play a central role in Lesotho (as well as elsewhere in Africa), particularly in the traditional rural sector. The implications of this are significant. Something on the order of 130,000 farms have no prime work-age male laborer present for crop farming, those with migrant income flows (which average 8 or 10 times the income level earned from farming) are poorly motivated to seriously farm. In addition, some one-half this number are without migrant worker incomes and thus are likely to be very poor--except to the degree that a sibling migrant remits small amounts of earnings to a one-parent (female-headed) household.

The available labor time that women can devote to the growing of crops is an unknown. Indeed, while most of the male labor force in Lesotho is either displaced to South Africa or not fully engaged in agriculture while on home leave, the Basotho female may well be over-employed much of the year. Basotho women also do have a vital role as

¹Ibid., p. 34.

homemakers; in child care and training; and in gardening, gathering water and firewood, making joala, and tending small livestock; in maintaining family health and nutrition. There are emotional, physical and nutritional drains associated with pregnancy, lactation, and absentee husbands --all of which detract from the female farm labor input. The simple acts of obtaining water, traveling to inaccessible markets, washing clothes, cleaning, cooking meals daily, and caring generally for children (some 350,000 under age 9) absorb a substantial amount of female time and energy. There is also a reasonable need for various forms of socialization as well as recognized disability, illness and traveling time to geographically dispersed and somewhat distant multiple crop fields. Furthermore, the level of human resource underinvestment, particularly in home and farm-related education for women, also may be greater than it is for males. The needs of women engaged in farming are far from fully recognized, especially with respect to simple tools, improved seeds, fertilizers, pest controls, sources of non-human energy, and domestic labor required.

Whereas the Basotho female's domestic household work often would benefit from more labor-saving technology (thereby improving the quality of household employment) this usually is not the case. Instead, emphasis far too often is placed on the male labor force; on capital intensive investments in the modern sector; or upon select forms of agricultural modernization such as tractor power. At the same time, most female homemakers-farm workers cannot hope to fully accomplish their entire work load--particularly at peak labor requirement (weeding) times.

Women in Lesotho face difficulties in obtaining needed Extension services, homemaking and agricultural training, credit, and especially basic home-related needs (e.g., rational access to markets for clothes, water, food and staples). This situation generates an overworked impact on the female labor force (even though there also may be a pool of slack labor on an aggregate yearly basis). The relatively underprivileged status of women, along with their inordinate responsibilities in agriculture at the present time, suggests that investments in female "human capital" are likely to generate returns greater than funds invested in manpower, particularly as regards agriculture.

Very little quantitative information is known in sufficient detail about the female labor force engaged in agriculture. Table 2 depicted the active female labor force as 246,000 persons, or about 48 percent of the total labor force in Lesotho.¹ About 35,000 of these were estimated to be female non-farm or migrant workers.² However, the recent IBRD mission on employment problems in Lesotho estimated the female labor force as 36 percent of the total, or 185,000 out of the total labor force. Based upon government data, the inordinately high female participation rate in Table 4 could be misleading in that perhaps a much smaller percentage of females participate actively in the labor force than is the case for males.

The female agricultural labor force of 211,000 shown in Table 4 requires adjustment since a female labor unit is not equivalent to a person day of male labor for various reasons. That is, an "equivalency"

¹These estimates are based upon data in the Second Five Year Development Plan, Vol. 1, p. 266.

²See IBRD, Report of Migrant Workers Re-Employment Mission, 1975, p. 6.

modification might well be made relative to men, irrespective of the discrepancies in the above stated female rates of labor force participation. For example, in terms of sheer physical power and labor stamina over prolonged periods of time, a female worker may not be equivalent to a male worker--providing instead perhaps 75 to 85 percent of the "energy equivalence" of a male.

It is not difficult to conceive of various non-farm activities requiring no less than five to six prime time hours daily per female and likely even more, given the domestic labor conditions prevailing in a developing society. Even after taking into account family related assistance in household duties from both elderly females and young girls, these domestic tasks will likely absorb something like one-half of all work hours available to a female in a normal working day. The above would suggest that a "time-adjusted" female farm worker may be about 50 percent equivalent to a male worker as a not unreasonable presumption.

Thus, a mid-point or "joint" physical energy power factor (80%) and homework adjustment factor (50%) is derived in Table 7 to estimate the female equivalence to the male person/day. These data adjustments result in a male manpower equivalent factor approximating 40 percent.

Table 7. Range of Female Labor Equivalent Factors Adjusted to Units of Full Time Male Man Days.

<u>Relative Physical Power Factor</u>	<u>Calculated Relative Farm Labor/Homemaker Factor</u>		
	<u>.60</u>	<u>.50</u>	<u>.40</u>
.85	.51	.43	.34
.80	.48	.40	.32
.75	.45	.38	.30

Needless to say, the data in Table 7 are crudely derived adjustment factors. But in the absence of research data on the subject, and in recognition of similar findings elsewhere in Africa,¹ the suggested adjustment seems considerably more accurate than assuming equivalency. Women simply do not have labor time available on a comparable basis to male workers in crop farming.

An estimated female work-age population (aged 15 to 59 years) of 320,000 persons was shown earlier (Table 2) for 1975, and the female labor force was estimated at 246,000. However, some 35,000 females are employed outside of the agricultural sector in Lesotho (largely migratory workers) as Table 4 indicated; thus, the unadjusted female labor force supplied to crop farming approximates no more than 211,000 persons.² Further taking into account the equivalence factor to reflect work of a domestic nature and a physical power difference suggests some 85,000 women are available to the female farm labor force in terms of male person-day equivalent units. Table 8 depicts these "guesstimates", assuming 211,000 agricultural female workers in the aggregate, adjusted to .45, .41, and .36 man-day equivalent factors--respectively, a female labor force approximating 95,000, 85,000 and 75,000 (male equivalent) labor units. In general terms, we shall tentatively identify female

¹See J.H. Cleave, African Farmers: Labor Use in the Development of Smallholder Agriculture, Praeger, 1974.

²If one takes into account the lower rates of labor force participation used in the above noted IBRD report, however, the available female farming labor force would only be about 150,000 (after accounting for some 35,000 women employed in a non-agricultural capacity).

labor available for agriculture as approximating 20 to 24 million mandays per year. This is a monthly average of 2 million or less mandays-- about twice the male labor input to agriculture. These estimates reflect variability in both length of work year (300 and 250 days) and male equivalent labor unit. However, they do not reflect what might well be a much lower rate of labor force participation as discussed earlier, which would translate into a reduced labor supply equal to 7 or 8 million mandays.¹

Table 8. Lesotho's Estimated Female Agricultural Labor Supply in Millions of Mandays, 1975.

	Estimated Equivalent Labor Supply in Male Mandays per Year ^a		
	High 95,000	Mid 85,000	Low 75,000
Man Days Labor Supply per Year (millions) ^b	28.5	25.5	22.5
Man Days Labor Supply per Year (millions) ^c	23.8	21.3	18.8

^aBased upon 211,000 persons x male equivalence factors of .45, .41 and .36 respectively as shown in Table 6.

^bBasis a 6 day work week (300 days a year).

^cBasis a 5 day work week (250 days a year).

Source: Tables 2, 4 and 7.

¹The ratio $(211,000-150,000/211,000) \times 24$ million. It should also be noted that the female farm labor force of 211,000 is an average of just slightly more than 1 female per FHH (190,000). If one, upon observing a village, recognized that each household required 1 full time woman per household 60 hours weekly of domestic duties, the "residual" female labor supply would approximate 21,000 women for farming. Considering domestic duties from older and young females along with some "household substitution" tends to confirm the estimates above.

Summary: Farm Labor Supply

The effective aggregate farm labor supply numbers about 130,000 equivalent labor input units. Ignoring input losses due to weather, sickness, holiday and competing labor programs (e.g., food aid for work which may consume a few million mandays yearly), there would appear to be about 1.56 million manmonths of agricultural labor. Considering adjustments for the above and some likely overestimation bias, approximately 30 million mandays yearly would seem to be a probable labor supply estimate, at a 65:35 female/male ratio. By way of contrast, the Basotho labor supply employed in RSA and off-farm in Lesotho is more than twice this level (see Table 3).

Farm Labor Demand by Function and by Crop

While aggregate manpower supply measures are recognizably imprecise, it is even more difficult to determine the demand for farm manpower. As with supply measurements, however, some approximation of demand can and must be made--irrespective of the paucity of firm research data. It is recognized herein that farming is essentially a woman's job in Lesotho. This is the case except for plough-plant operations, traditionally male tasks.¹ This long-ingrained attitudinal factor along with peak load farm labor needs may contribute to an effective labor supply-demand imbalance in Lesotho.

¹Livestock "herding-tending" also is essentially a male task, largely the responsibility of young boys and (mostly older) men. It is worth noting in this respect that census data suggest some 123,000 persons engaged in the task of caring for 3+ million head. 1975 population estimates published in the Second Five Year Development Plan (p. 265) indicate some 120,000 Basotho males aged eight to 15 and 60 to 70 years (Bureau of Statistics, 1970 Agricultural Census, p. 157).

In the demand projections which follow, we shall initially assume the existence of a customary sex-defined division of labor. The prevailing customs and largely traditional farm methods, which include very little modern technology, are also assumed in estimating labor demand requirements. Manday requirements are not based upon "actual" inputs today; rather, they presume a level of labor input necessary to "adequately" farm the existing capacity of arable acreage.

It is clear that estimated demand for crop-farm manpower will vary widely--depending upon a variety of factors such as hourly customs of work, yields, seasonality, climate, soil types, technology, etc.¹ In short, variations in prevailing physical, socio-economic, and cultural factors render somewhat hazardous any estimate of the number of mandays required to farm--even if identifiable technology-factor intensity levels of production were known. Because these are obviously significant variables, the figures in Table 9 are tentatively identified again, and on an estimated "range" basis. It must be recognized also that "timeliness" of farm operations are critical to output and yields. This is especially true for weeding (required most urgently some 20 to 50 days after planting) but also for plough-plant and harvest activities. All values are in terms of custom-defined mandays of labor per acre for the typical

¹ Considerations which result in significant differences in mandays required per acre also include crop type and mix, planted acreage vs. land fallow, stage and nature of weed growth, land characteristics, and climatic factors. Still other physical factors, such as the number of oxen (and men) per plough or the number and nature of tools and their distribution, also have a significant bearing upon manday labor requirements. Additionally, worker productivity per day relates to age and health, supervision or work-income incentives, and the general social character of the African work experience ("customary" hours worked per day) can generate differentials in the number of mandays of labor required to perform farm functions.

Table 9. Estimated Manday Requirements per Acre by Crop under Traditional Methods and Prevailing Technology-Tool Inputs*.

Farm Function	Maize Mandays			Sorghum Mandays		
	A	B	C	A	B	C
Plough	4	na	3- 5	4	na	3- 5
Plant-Fertilize	2	na	2- 3	2	na	2- 3
Harvest	2	3	3- 5	4	6	6- 7
Harvest-Process ^a	2	10	8-10	3	7	5- 7
Miscellaneous	0	2	1- 2	0	2	1- 2
LEVEL I.....	<u>10</u>	<u>15+</u>	<u>17-25</u>	<u>13</u>	<u>15+</u>	<u>17-24</u>
Add:						
Pest Control	2	1	1- 2	1	0	1- 2
Weeding	<u>6</u>	<u>5</u>	<u>6- 8</u>	<u>6</u>	<u>5</u>	<u>6- 8</u>
LEVEL II.....	<u>18</u>	<u>21+</u>	<u>24-35</u>	<u>20</u>	<u>20+</u>	<u>24-34</u>
LEVEL III ^b	+10	na	+12	+5	na	+12

Farm Function	Beans Mandays			Wheat Mandays		
	A	B	C	A	B	C
Plough	4	na	3- 5	4	na	3- 5
Plant-Fertilize	2	na	2- 3	2	na	2- 3
Harvest	4	4	4- 6	4	na	4- 6
Harvest-Process	5	12	11-15	2.5	na	4- 6
Miscellaneous	0	2	1- 2	0	na	1- 2
LEVEL I.....	15	18+	21-31	12.5	na	14-22
Add:						
Pest Control	3	0	1- 2	na	na	na
Weeding	<u>6</u>	<u>5</u>	<u>6- 8</u>	<u>na</u>	<u>na</u>	<u>na</u>
LEVEL II.....	24	23+	28-41	12-5	na	14-22
LEVEL III ^b	+10		+15	+5		+8

* Data must be viewed as approximations due to lack of research on the subject.

^a Includes thresh, shell, pick, grade and winnow.

^b Includes estimated yield increases of 50-100% (or more) in (A) and (C) and added labor inputs attributable to a 2nd weeding; added land preparation, and additional fertilization as well as pest control treatment.

Source: Based upon estimates in BASP Table 1, Annex 14 for (A); Leribe Pilot Agricultural Scheme, Information Paper, 1972 for (B); and discussions with Lesotho authorities and LSCE staff estimates are shown in (C).

rain-fed crop-farm operations observed in Lesotho. In general, this includes a four-hour day in plough-plant operations and a six-hour day in weeding less some down-time in traveling to fields, etc.¹

The demand estimates in Table 9 are from various sources--including data contained in the BASP proposal (estimate "A"), tentative research results from the Leribe Project (estimate "B"), and the author's estimates derived informally with Lesotho authorities (estimate "C").¹ Technology Level II demand estimates include weeding and some pest control labor inputs not shown at Level I, and only partially accomplished at the present time in Lesotho. Level III estimates reflect up to a doubling of crop yields, with corresponding increases in manpower requirements, as noted in footnote (b) on Table 9.

While estimates derived in A are the lowest of those shown in Table 9, it is noteworthy that the B and C estimates are reasonably similar. If estimated plough-plant manpower requirements (generally agreed upon at 6-7 days in A and C are included in B (the Leribe data), one can observe that the Leribe data approximate a general mid-point of our estimates (shown in Column C of Table 9). For the most part, variances in the three estimates are attributable to estimation differences in the "basic" harvesting operations. That is, given the limited data available, agreement is reasonably uniform upon mandays demand for both the plough-plant and the weeding labor demand functions.²

¹See, for example, Cleave, *Ibid*, and S.D. Turner, "Sesotho Farming", unpublished Ph.D. thesis, University of London, May 1978, pp. 169-200.

²Additional research is underway on these "guesstimates" within the LASA research staff.

Accordingly, per acre manday requirements are shown in Table 10. These are shown for input-output Levels I, Ia, II and III for each of four key crops grown in Lesotho. The data shown in Table 10 include probable range estimates in recognition of obvious variances. Thus, for example, Table 10 includes six to eight mandays of male labor per acre for plough-plant activities derived from Table 9. Table 10 also includes range estimates in Level II of some six to eight added mandays per acre for weeding plus another one to two mandays for pest control (exclusive of wheat) within the aggregates for total mandays.¹ Levels I and Ia are distinguished by the latter incorporating "some" weed-pest control labor inputs (approximately 3 mandays)--roughly comparable to the farm practices which appear to prevail today in Lesotho. Level II assumes a fully implemented weed-pest control function (7 mandays), and Level III involves substantially increased farm inputs (and outputs) as explained in note (b) to Table 9.

Table 10. Range Estimates of Aggregate Manday Demand Per Acre by Crop

	<u>Maize</u>	<u>Sorghum</u>	<u>Beans</u>	<u>Wheat</u>
LEVEL I:				
Range	20-24	20-24	24-28	16-20
Mid.....	20.....	22.....	26.....	18
LEVEL Ia:				
Range	23-28	23-28	27-32	16-20
Mid.....	25.....	25.....	29.....	18
LEVEL II:				
Range	26-32	26-32	30-38	16-20
Mid.....	29.....	29.....	34.....	18
LEVEL III:				
Range	36-42	36-42	40-50	22-26
Mid.....	39.....	39.....	45.....	21

Source: Table 9.

¹Also derived from prior Table 9.

For general purposes here, the total manpower input per acre under traditional farming techniques with no weed-pest control activities would appear to require some 22 mandays of labor for maize and sorghum (Level I); with "some" weed-pest control as in Level Ia, 25 mandays per acre; and approximately 29 mandays per acre at Level II.¹ Labor absorption for beans and wheat production are respectively higher and lower. Production requirements increase by nearly two weeks of labor input at higher input-output levels (denoted in Level III). The substantial increases in labor demand for Level III do not reflect changes in farm technology (away from the present labor intensive methods), except that added investments in pesticides and fertilization are presumed. It should be recognized that the above "estimates" may be too low or conversely too high--perhaps by as much as several mandays per acre. But absence of definitive research on demand for farm labor does not allow more specificity at this time.

Peak Load Manpower Shortages

Farm labor demand in Lesotho is not evenly distributed over a 12-month year. Clarity on the labor surplus-scarcity issue can best be gained by examining the individual male-female tasks for farming, since plough-plant and weeding operations are distinctly male and female by tradition. Moreover, it must be recognized that farm operations must be done on a reasonably timely basis. The timing of farm practices (hence available manpower supply) is critical to total acreage planted, crop

¹This may represent demand underestimation, at least according to Turner, Ibid, who states "0.5 ha, yielding an average of 250 kg, might occupy 45 mandays" (p. 200), and again "3 to 4 persons may weed an average field in one to two weeks" (p. 187).

yields, and thus aggregate production and (farm-earned) income. Agriculture in general, and rain-fed agriculture under Lesotho's climate-pest-fertility conditions in particular, may be constrained by the fact that seasonal peak load demand (M^d) might exceed manpower supply (M^s).

Male Manpower Scarcity:

Previously it was suggested that the male labor supply provided approximately one million mandays per month, and that demand for plough-plant farm functions required some six mandays per acre.¹ Under such conditions, and recognizing the crude estimating ranges developed earlier, the acreage which can be planted in one month by the male labor force in Lesotho is illustrated below in Table 11.

Table 11. Acreage Ploughed and Planted per Month by Male Labor Force Under Varying Demand-Supply Conditions.

<u>Mandays Demand Per Acre</u>	<u>Acreage Treated by Supply of Male Mandays per Month (millions)</u>		
	<u>1.1</u>	<u>1.0</u>	<u>.9</u>
5	220,000	200,000	180,000
6	183,000	167,000	150,000
7	157,000	143,000	129,000

Source: Calculated from Tables 10 and 4. (Note that this is a 30 work day month).

Given that at capacity levels, 300,000 acres of arable land is cropped in Lesotho, it may not be feasible for the male labor force to accomplish the requisite cultivation on a timely basis. Let us assume, for example, that something like 150,000 acres can be plowed and planted per month.

¹See Tables 6 and 9.

Suppose further the normal period of time during which this function can be performed on a timely basis for maize, sorghum and beans is about 8-10 weeks during the September-November period. Under such circumstances some 300,000 to 400,000 acres could be prepared. At arable land capacity levels and crop-mix proportions of recent years, there is a potential male labor demand for 600,000 planted acres--which is at least half again as large as the effective male labor supply.¹ Essentially, the male labor force demand requirement is some four manmonths to plough-plant the maize, sorghum and bean crops (plus yet another two manmonths) for wheat later in the season. This relationship is illustrated below in Table 12.

Table 12. Range of Probable Maize-Sorghum-Bean Acreage Feasible to Prepare by Male Labor

Acreage Prepared Per Month	(000 acres)			
	Alternative 1.7	2.0	2.0	3.0
130,000	220	260	325	390
150,000	255	300	375	450
170,000	290	390	425	510

Source: Calculated from Tables 10 and 4.

From Table 12 it is clear that even if the proper timing for plough-plant functions is extended to 2.5 to three months during a calendar year, the maximum that could be ploughed and planted is something like 400,000 acres of maize, sorghum and beans. In conclusion, it appears (again on a rough order of magnitude basis) that only one-half to perhaps two-thirds of available arable acreage can be subjected to adequate

¹800,000 arable acres with 75% of all land in these three crops.

plough-plant farm operations because of a male manpower constraint (assuming power and limited tractor mechanization to be at levels prevailing today).

Female Labor Scarcity?

The critical female labor input to farming in Lesotho concerns particularly weeding. In order to obtain good to optimal results from weeding, timing is critical and of relatively short duration. Moreover, the female input utilized in weeding is a farm function with a very high marginal product of labor. Under experimental farm conditions, for example, it has been found that "timely" weeding (at about the 30th to the 60th day after planting) increased maize production by some 1,200 lbs. per acre, as shown below. In contrast no weeding or weeding 90 days after planting produced a total of some 100 and 400 lbs. of maize, respectively.¹

	<u>Marginal Output in Number of 200 lb. Bags Increased Yield (over no weeding)</u>
Weeding: 30 day interval	+ 5.9
Weeding: continuous for 60 days	+ 12.1

Continuous weeding over the first 60 days yields still another 1,200 lbs. of marginal product; however, this would represent no less than doubling labor demand for the female labor input supply -- an impossible situation to accommodate.

¹See Ministry of Agriculture, Report of Crop Research in Lesotho, 1960-1965.

An estimated female labor supply equivalent to an average of 1.7 million mandays per month was derived earlier (Table 8).¹

Given some "off time" adjustments relative to the supply of female labor, Basotho women may not have sufficient effective labor time to accomplish an adequate weed-pest control function at capacity levels of planted arable acreage for maize, sorghum and beans (Table 13). By "effective" we also recognize the culturally defined work day and lack of incentives as important constraining factors. Suppose, for example, the weed-pest control function were accomplished at a rate of eight culturally defined mandays of work per acre. Also assume the mid-point supply estimate is 1.5 million mandays of available female labor. Then approximately 188,000 acres could be prepared per month (1.5 million ÷ 8 = 187,500 acres). However, this situation contrasts sharply with the some 600,000 capacity acreage available for raising maize, sorghum and beans-peas.

Table 13. Acreage Weeded per Month Adjusted Female Labor Supply Under Varying Demand-Supply Conditions

Mandays Demand for Weeding Per Acre	Adjusted Female Mandays Supply per Month (millions)		
	1.3	1.5	1.5
7	186,000	214,000	257,000
8	163,000	188,000	225,000
9	145,000	167,000	200,000

Source: Calculated from Tables 10 and 4. (Note that this is a 30 work day month).

¹This estimate excludes women involved in various food-aid work programs. At compensation levels approximating R1.00/day (for 5-6 hours of work), some R7.0 million is spent annually, constituting a significant pre-emption of labor for farming by the food-aid program.

It seems from these data that the aggregate acreage which can be prepared by the female labor force ranges at the maximum from, say, 200,000 to 240,000 acres per month.¹

It is near impossible to determine more definitive data magnitudes, and it is equally difficult to pinpoint the aggregate time span during which weeding functions can be carried out without significantly impairing yields. What is clear, however, is that on the average the female labor force in Lesotho might weed, for example, 220,000 acres monthly-- or twice that amount over a 2-month period. Thus, the aggregate capacity for weed-pest control approximates some 330,000 acres if a 1.5 month period of time is available for weeding as is shown below in Table 14. Provided that a longer period of time (say two months) were available, a greater proportion of the 600,000 capacity level of planted acreage could be subjected to the weed-pest control function.² In general, it appears that the female labor input is able to prepare adequately perhaps as little as one-half and no more than 75 percent of the total available acreage which could be planted to these three basic crops.³

¹This estimate ranges to the high side in reflection of several facts such as that to some unknown degree, food-aid labor "might" be sensitive to seasonal farm needs.

²As before, these data are based upon three main crops (excluding peas and wheat).

³Additionally, one must recognize that the female labor supply in manpower equivalents is discontinuous; i.e., it is based upon 211,000 female laborers subject to varying micro circumstances of domestic household, food-aid labor and partial agricultural employment. Depending upon these competing time demands and also upon income sensitivities relative to remitted migrant worker earnings and food-aid wages, the timing-regularity of the female labor supply might be severely disrupted.

Table 14. Range of Probable Maize-Sorghum-Bean Acreage Feasible to Prepare by Female Labor.

(000 acres)

Acreage Prepared Per Month	Alternative Number of Months for Weed-Pest Control Function		
	1.0	1.5	2.0
200,000	200	300	400
220,000	220	330	440
240,000	240	360	480

Source: Calculated from Table 13.

The Peak Load Labor Problem in Summary

It would appear that both the male and the female components of the aggregate stock of manpower are unable to adequately farm available arable acreage in Lesotho because of peak load labor constraints. Instead, the present supply of Basotho manpower can provide a level of labor input adequate for perhaps some two-thirds of the arable acreage that might be used in producing maize, sorghum and beans. This view is consistent with recently observed increases in fallow land and also with the general tendency in Lesotho to partially weed planted cropland. Labor withdrawals related to alternative employment options may serve further to intensify this peak load labor shortage. This particularly could relate to farm income disincentives following the four-fold increase in mine wages since the early 1970's. In short, the partial and often poorly timed nature of labor inputs to farming in Lesotho, and the failure to produce at levels once achieved, have one basic explanation: a labor shortage in Lesotho constrains agricultural output.

The Aggregate Human Capital Balance Sheet

A manpower scarcity has been hypothesized as a material explanation for recent economic declines in Lesotho's farming sector. Moreover, this labor shortage is also viewed as a constraint to the improvement and expansion of agricultural output in the future so long as the current level of labor exports prevail. While manpower scarcity is contrary to the conventional wisdom in certain respects, recognition of this fact can lead to more accurate development policies that have a potential for increasing output. Let us examine manpower requirements in the aggregate in what follows in order to assess select macro problems relative to the aforementioned micro peak-load labor shortage.

Earlier tabulations revealed some 25, 29 and 18 mandays of labor demand per acre for maize, sorghum, beans and wheat, respectively, under traditional farming practices (Level Ia), or a weighted average demand of about 25 mandays per acre.¹ This need is in contrast to a yearly aggregate potential male and female manpower supply of some 30 million mandays for farming 800,000 acres, or about 38 mandays per acre, somewhat more than 3 mandays monthly per acre. While such comparisons depend upon many factors, including crop mix, total labor demand (M^d) is approximated by:

$$M^d = \begin{array}{l} \text{Planted} \\ \text{Acreage} \\ \text{Capacity} \end{array} \times \begin{array}{l} \text{Mandays} \\ \text{Required} \\ \text{Per Acre} \end{array}$$

20 million = 800,000 x 2t

This is so under traditional farming operations or at Level Ia of Table 10. In contrast, potential manpower supply (M^s) may be half again that

¹Weights are based upon crop mix to total planted acreage--64% for maize-sorghum production, 12% for bean-peas, and 24% for wheat (based upon the years 1973-76).

large. This situation is suggestive of a 33 percent rate of surplus labor or underemployment (\bar{u}) in Lesotho's agricultural sector over a full year period of time. That is:

$$\text{annual } \bar{u} = (M^S - M^d) \div M^S$$

$$33\% = \frac{30 \text{ million} - 20 \text{ million}}{30 \text{ million}}$$

Let us ignore for the moment certain "fine-tuning" details (e.g., supply-demand variance derived earlier) and look more carefully at the aggregate manpower situation. If labor inputs are required on an uneven basis during the year due to seasonal considerations and if farm system technology "levels" (I, Ia, II or III) shown earlier are considered, underemployment is only a part of Lesotho's problem.

If, for example, the farm function required at Levels Ia, II and III must be completed in two-thirds of a calendar year, available M^S as adjusted approximates 20 million mandays ($30 \times .67$). Thus, the absolute amount of "surplus" labor (L^S) at Level Ia (i.e., with "some" weed-pest control) is zero mandays, as is shown in Table 15 below (as before data are for 800,000 planted acres). For the most part, however, it appears that the supply of labor is not capable of meeting demand requirements, and this is especially so if the "effective" farming year is reduced to less than two-thirds of a year -- say to one-half of a calendar year. Indeed, in only one instance is there an effective surplus of farm labor, as Table 15 reveals.

Table 15. Aggregate Levels of Labor Scarcity and Surplus in Millions of Mandays.

Effective Farm Labor Demand Level (a)	Effective Farm Year of:		
	3/4 year	2/3 year	1/2 year
Level Ia: $L^S = M^S - M^d$	+3=23-20	0=20-20	=5=15-20
Level II: $L^S = M^S - M^d$	0=23-23	-3=20-23	-8=15-23
Level III: $L^S = M^S - M^d$	-7=23-30	-10=20-30	-15=15-30

(a) 25 to 29 mandays per acre at Level Ia, for example.

Source: Calculations from Table 10.

Serious labor scarcities, not surpluses, do in fact arise (a) at higher technology levels of farm input-output and (b) as the effective farm calendar year for implementing functional practices decreases. Clearly, Level II (requiring one full weeding) and also Level III operations (which involve output targets often found in development projects) are not attainable objectives! The supply of labor cannot meet labor demand.

In summary, it is likely that basic farm operations in Lesotho can not be stretched over a period in excess of six to eight months if farm functions are properly timed. At a minimum, it is quite clear that significantly improved farm practices (involving additional labor for land preparation, pest control application and near-continuous weeding) are not feasible. Thus, and in spite of aggregate yearly underemployment, labor is scarce and does appear to be a real constraint to development.

Summary and Conclusions

While available data admittedly are crude, the manpower circumstances which prevail today suggest that:

1. The existing Basotho agricultural labor force aggregating nearly 300,000 persons includes essentially no permanent core of prime work-age males. While regarded as an adequate total supply by many observers,¹ this adjusted full time equivalent supply of manpower available to farm is less than one-half this number (some 130,000 manpower units).
2. Aggregate underemployment in agriculture (approximately 33% exists on a year-around basis. However, real labor scarcities prevail over the effective farming year and at peak load (plough and weed) times.
3. Approximately 30 million mandays per year of labor inputs are available for farming in Lesotho--an average of 38 days per acre annually, or about three mandays per month, for 800,000 planted acres.
4. Labor supply is significantly less than the demand for labor under increased input-output conditions capable of generating levels of crop production existing 20 to 25 years ago--unless one irrationally assumes there is a uniform monthly labor use.
5. Presently, the male labor force is capable of providing manday inputs sufficient to farm perhaps one-half to two-thirds of total arable cropland.
6. The female labor force supply presently appears to be capable of meeting no more than two-thirds of peak load demands. Significantly improved farm practices (involving a doubling of weeding mandays) are not possible under the prevailing labor intensive farm technology.

¹For example, it is alleged that labor demand is "...low and not likely to exceed availability," in BASP, Annex 13, p. 7.

7. To utilize the 800,000 available arable cropland acres, a very sizeable addition in full time male and female farm workers would have to be absorbed in farming in order to meet peak load demands.¹ The magnitude of increased farm labor inputs generally required appears to be about 50 percent greater than the existing agricultural labor force.²
8. Being able to earn an amount equal to a year's (uncertain) crop-farm income by a few days or weeks of migrant labor work renders the male Basotho workers' choice an easy one. Further, given the opportunity to earn a certain sum in a few months from food-aid labor that can easily equal gross margins from farming a few acres, the female labor supply in farming likewise diminishes. Under these conditions, there is little or no reason to work in the fields--for both the male and female manpower component--except perhaps to retain land use rights for future options under the prevailing land tenure system.
9. The Lesotho economy is confronted today with an enigma of substantial importance. Presently agricultural labor shortages do appear to prevail even though vast data improvements are needed. This labor constraint exists in real physical terms; it exists in terms of labor force withdrawals in deference both to (a) income levels/employment options in South Africa and (b) to "food-aid" labor projects; and it prevails in a

¹Not being able to meet peak load demands results in ill-timed and low quality land preparation along with partial or "some" weeding activities--all of which explain the yield and production declines shown in Table 1.

²That is, since about two-thirds of peak load labor needs are now met, the labor force must expand to 1.5 times its present size (also increasing underemployment).

qualitative, farm management context. The problem is significant enough to induce increased fallow land and yield and output declines as can be observed today. It also constrains the future development of crop agriculture. Second, the possibility of "remigration" from South Africa is a real fear and in some measure a future probability. It is an event, for the most part, however, that Lesotho will not influence nor can it be predicted. Third, income from South Africa is vastly more important to human welfare than output produced in the agricultural sector--indeed, total migrant earnings are more than twice as large as total GDP itself. Given these basic facts, Lesotho is also confronted with conflicting sets of objectives--and public policies adopted cannot help but mirror these realities.

10. Consideration should be given to contingency plans to relieve the overworked female component of the labor force and to development of a "migrant worker re-employment" program. As visualized, it might incorporate the following elements:
 - a) Development of concrete plans for and an institutional capability to facilitate orderly manpower re-migration back into the Lesotho economy if future circumstances do in fact necessitate such an event. In this respect, labor using investments are a proper direction for agricultural development projects. However, seasonal labor scarcities, particularly those affecting female farm workers, first must be alleviated. This might embody a considerable expansion of garden farming and less extensive use of land resources.

- b) Actions designed to gradually alleviate labor scarcities prevailing today must be expanded. This also can combine schemes to introduce cropping patterns which mitigate peak load seasonal labor demand; select forms of capital substitution for labor; and perhaps gradual assimilation of select migrant workers into the farm work force (particularly persons most likely to operate as "progressive" farmers).
- c) Reorganization of programs such as food-aid labor in order to better relate them to peak load needs and income incentives tied to crop production. That is, consideration might be given to enhancing human welfare via land use schemes which do not conflict with seasonal labor requirements in farming, either directly or indirectly (via income substitution effects). Additionally, labor intense projects not in conflict with seasonal farm labor needs must be expanded to decrease underemployment.