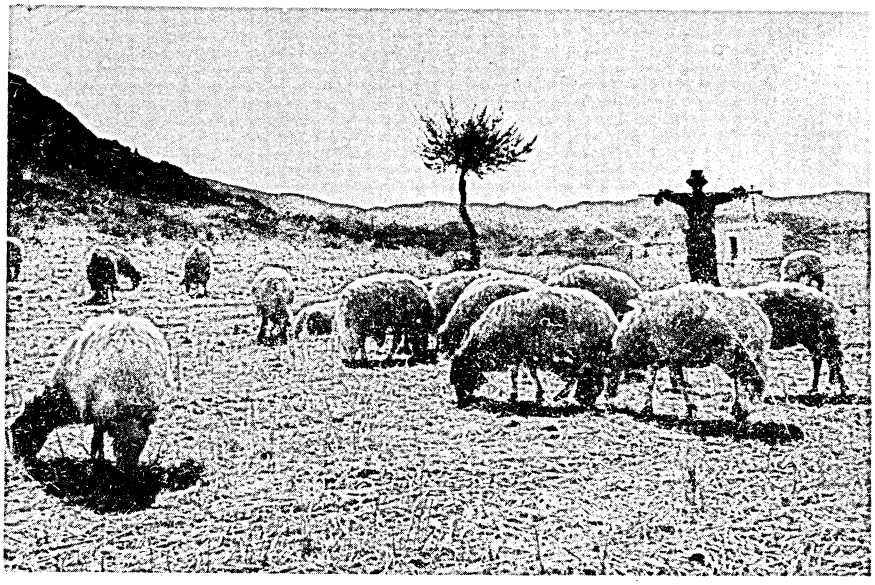
MINISTRY OF AGRICULTURE AND NATURAL RESOURCES

CYPRUS AGRICULTURAL RESEARCH INSTITUTE

COST AND RETURNS



OF SHEEP AND GOATS

Farm Management Report No. 3

C O N T E N T S

LIST OF TABLES AND DIAGRAMS

FOREWORD

This report gives an analysis of sheep and goat farming in Cyprus. It contains technical and economic data which can be of benefit to livestock owners, the government departments and other policy bodies.

It instigates further research in technical and economic fields and challenges the herders and their associations to initiate activities for further improvement of the sheep and goat enterprise.

This work has been carried out by the Institute's officers Messrs. Erol Djemal and L. HjiParaskevas, assisted by Mr.P.Zavos, under the direction of Dr. P.C.Muntjewerf, F.A.O. expert. The cooperation of Mr. D. Hoyer of the American Peace Corps is acknowledged.

Acknowledgments are expressed to Messrs. J. Papadopoulos and Dr. G.HjiPieris, Director and Officer of the Animal Husbandry Department, who were so kind to study the first draft. Their excellent comments and useful suggestions have been taken into consideration

Th. Christou
Director
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I. SUMMARY

Sheep and goat herding is an important part of agriculture in Cyprus, representing 10% of the agricultural income, and being the main occupation of about 10.000 rural families. As imports of mutton and dairy products are increasing rapidly, further development of meat and milk production in the island is urgently needed The purpose of this study was to investigate the existing situation as a preliminary step towards making suggestions for future improvements.

Three groups of herders with different herdsizes have been investigated: 26 herders with 31-60 animals, 16 with 61-90, and 7 with more than 90 animals. Most flocks were mixed sheep and goat herds. The period covered was the year from 1st November 1962 to 1st November 1963.

Contrary to the general expectation, almost all the herders owned and rented land, many of them had a considerable acreage. The average was 64, 99 and 156 government donums for the three groups, respectively. These acreages are proportional to the average herd size.

It was observed that the turnover increased with increasing size of flocks, being 18, 25 and 33 % for the three groups respectively. High turnover may diminish the possibility of selection of young stock as too many lambs are needed for replacement.

The average birth rates for all three groups were about 1 lamb per ewe, ranging however from 0,7 to 1,3 for individual flocks. The low rates indicate a high percentage of barrenness which might be due to inadequate nutrition. The average mortality rate of 5 percent for lambs was quite favourable.

On the average goats represent 20% of the animals in the herds. The yearly death rate for goats was 20 percent, which is very high. Birth rates ranged from 1,1 to 2 kids per goat, permitting good possibilities for improvement.

Areas rented for grazing were far in excess for the own cultivated area. Free grazing land and non-agricultural land was also used to a great extent. It was observed that the total area covered for

grazing did not increase in proportion to the herdsize but on the contrary decreased.

Grazing practices are as follows: From January until April natural vegetation on fallow-land and barley farras is available. During the month of April and May green vicos and favetta is utilized. This ends the green feeding period. Then the barley and wheat stubble period commences, continuing to the middle of October. At the end of September hand feeding starts with barley and legume seeds combined with straw and continues until February. Non agricultural land was grazed the whole year round. In addition to these commonly used fodder-crops a great variety of residues of other marketable crops were available.

The comparison of available dry matter supplies and requirements indicate that great quantities of dry matter were wasted. Milk for lambs and kids takes an important part of the total milk production, especially in the bigger flocks.

The average annual milk production per animal was 86, 81 and 83 okes for the three groups respectively, ranging from 40 to 140 okes per animal for individual flocks. Wool production per ewe averaged 1,33 okes ranging from 0,42 to 2,74 okes per fleece. A large part of the manure produced is sold and constitutes an attractive cash receipt.

Labour expense for herding is very large, with an average of 51 hours per animal per year, decreasing as the size of the flock increases.

On the average over 3 okes of milk were produced during one hour of milking and one hour of labour was needed to produce one oke of cheese.

Sheep and goat husbandry is a real family enterprise requiring from 8 to 10 man hours every day of the year and about half as many women hours.

The owners of larger flocks hire extra labour, but this is not more than 20 % of the total labour supply.

The price received for milk was on the average 102 mils per oke with a range from less than 90 to over 110 mils.

Halloumi prices ranged from 12 to 14 shillings per oke, and anari prices from 3 to 5 shillings per oke, but 71 percent of the halloumi and 88 of the anari was used for home consumption.

Lamb and ewe prices showed a wider variation which could not be satisfactorily explained. There was a slight indication that lamb prices per oke decreased with an increase in the age of the lambs. Undoubtedly a number of factors such as selling time, market conditions etc. have an influence. But it was clear that on the average keeping of lambs for heavier weights did not pay.

The economic situation of the enterprise are best expressed by the labour return per ewe or per goat. This was an average of three pounds, the difference between the total returns on the one side, and the costs excluding labour on the other. The most important cost factor was feeding stuffs; the next was milk for lambs and kids. Those two factors together amounted to over £ 10 per head. The costs of feeding stuffs varied considerably from herd to herd, ranging from zero to twelve pounds per head, depending on the extent to which the herd depends on free grazing land. Since "feeding costs" play such an important role in the total cost picture, further detailed studies should be conducted on this aspect.

Milk feeding costs varied tremendously, ranging from two to ten pounds per ewe. No positive relation was found between milk fed and price of lambs and kids, nor between the milk costs and the amount of meat sold or added to the inventory.

The main return item was milk, which was principally influenced by the milk yield per head. The next most important item was return for meat. Improvement in either or both by selection of animals will certainly lead to increased financial results. Returns of secondary importance were for wool and manure. The return to labour varied widely among individual herders. It ranged from minus 4 pounds to 10 pounds per head per year. If we only took the middle group out of

the frequency-distribution table, representing 70 % of the herders, there was still a difference of six pounds between the extremes.

Although the average return per labour hour was low, the family income was not unsatisfactory because of the large number of working hours per year. Under the present management conditions a return per hour of one to one and a half shilling is quite possible.

Labour in cheese making returned about 2 shillings per hour.

The ultimate spendable family income for the three herd size groups was £ 193,7, £ 231,9 and £ 397,6. The value of the products used for home consumption, an average of £ 62,4 per family, should be added to this.

When comparing herds with good and with poor results we observed that there was a difference of £ 6 per year in labour return per head. From this we conclude that there must be great opportunities to raise the income of the sheep and goat owners.

Through the close cooperation of scientists and progressive farmers it should be possible to make this one of the better paying enterprises in the Island.

II. INTRODUCTION

If agriculture maintains its traditional pattern of production in a developing economy it will soon lag behind in income with other industries. Hence constant changes are necessary when investigations have led the way to new possibilities.

In order to introduce such changes successfully a thorough knowledge of the present economic position of the farmers is required. Among others the income level under present standards of management has to be determined. Knowledge on the relation between cost and return in physical as well as money terms is a first prerequisite in order to understand why farmers do not automatically adopt more promising farming methods already applied in other countries. Rental systems, farm size, grazing rights, land fragmentation and farming know-how may be some of the important factors standing in the way of further progress.

The first objective of this study is to determine the income level of the interviewed sheep and goat farmers and the input-output data of the commodities they produced in their enterprises. With the necessary caution the results obtained can be used as a basis for giving a general picture of sheep and goat enterprises in Cyprus.

The second and far more important and interesting objective is to point out some of the weaknesses of present operations and to consider ways and means of improving the present income level. But to start on the second without having completed the first is a rather precarious and dangerous activity.

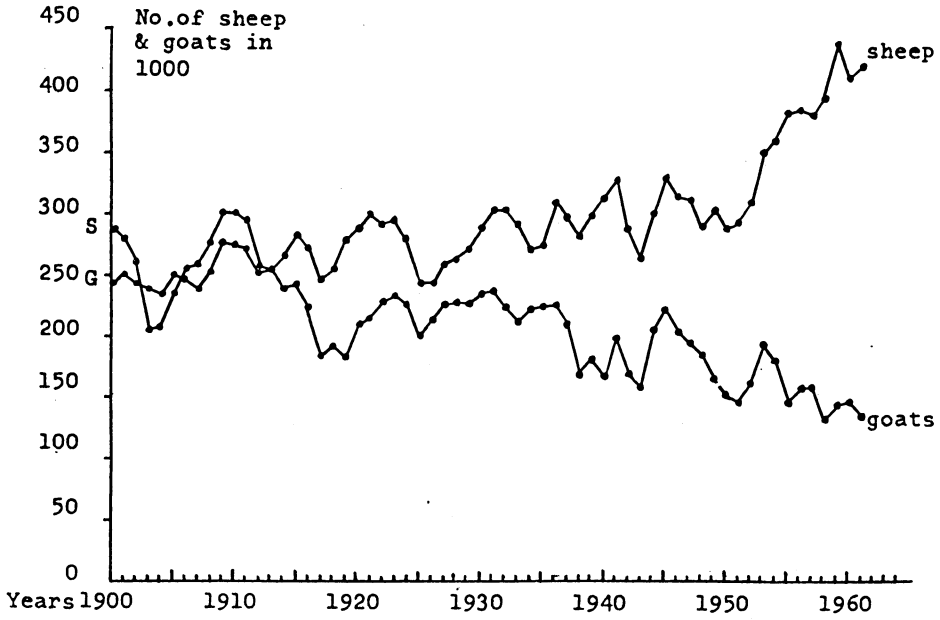
The decision to undertake a study of sheep and goat farming was based on the following considerations. In the first place, this sector of animal production in the island represents about 10 % of the total agricultural income in Cyprus. Secondly, it concerns an important part of the agricultural population, as we estimate the number of flock-owners to be about 10.000. Thirdly, the domestic animal husbandry potential should be investigated in view

of the rapidly increasing imports of livestock products. The imports of mutton and lamb amounted to 10 % of the domestic production in 1962.

Diagram 1

As shown in diagram 1 there has been a remarkable increase in the number of sheep in Cyprus and a decrease in the number of goats. This trend may well further continue.

Development found in the number of Sheep and Goats



The choice of the sample necessitated preliminary work to obtain the required distribution of the various size flocks over the Island. Based on the study of Dr. D. Christodoulou [1] first were selected a number of representative villages in the island. Information available in the Veterinary Department gave the distribution by herdsize in those villages as shown in table 1.

1) Demitris Christodoulou
The rural land use pattern in Cyprus 1959

Table 1

Distribution of flockowners by herdsize of sheep and goats in a number of selected villages

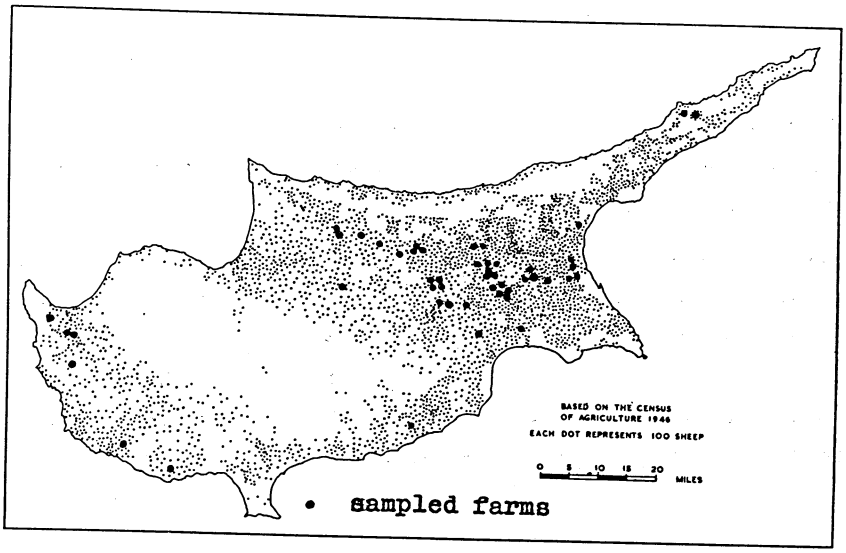
Herdsize	Sheep		Goats	
	Number	in %	Number	in %
1 - 30	394	27	532	67
31 - 60	611	42	90	12
61 - 90	313	21	64	8
91 - 120	107	7	50	6
over 120	50	3	58	7
Total	1475	100	794	100

In accordance with the number and size of flocks in these representative villages, the total sample of 50 herd owners was stratified. Next a number of herders in each village and size group were selected at random, from which a final selection was made by the muktar of the village on the basis of willingness, reliability and competence to give correct and unbiased information.

Since it was assumed that owners with flocks of 30 animals or less were not mainly occupied in sheep and goat farming this group was eliminated. Although 27 % of the sheep-owners fell in this group it represented only 8 % of the sheep. For goats this assumption has more serious consequences, since 67 % of the goat owners had less than 30 goats. However, as this group included all the owners with a few tethered goats, it represents only 20 % of the goats.

It should be noted that due to limitations of the total numbers in the sample certain areas have not been included such as the Troodos Mountains and the Kokkinochoria area. However, the sample does represent most of the important areas in Cyprus.

In the map below the distribution of the sample is shown projected on the distribution of the sheep population of the census 1946 (Christodoulou).



In table 2 the finally selected sample is summarized. The actual size of the herds of which the owners were interviewed slightly differs from the originally recorded herd size. It was impossible to separate in advance the mixed herds from the herds with only sheep or only goats. Whether the owner had a mixed flock or not could only be discovered on the spot during the interview.

Table 2

Distribution of selected herders by herdsize & district

Herd size	District						Total	Interviewed
	Famagusta	Nicosia	Paphos	Larnaca	Kyrenia	Limassol		
A 31-60	11	7	3	2	1	1	25	26
B 61-90	9	5	1	1	-	-	16	16
C over 90	4	2	1	1	1	-	9	7
Total	24	14	5	4	2	1	50	49

In group A were only 3 flocks with only goats and 4 with only sheep. Group B had four flocks of only sheep. All the other 38 were mixed sheep and goat flocks.

The questionnaires were prepared in such a way that they would furnish reliable information about grazing, feeding, lambing, milking and selling of animals during the year. As a herd is a constantly changing unit it is obvious that great care had to be taken in order to obtain an accurate and balanced record. We acknowledge the patience and dedication with which the herders furnished the information.

III. SOME CHARACTERISTIC FEATURES AND TECHNICAL DATA OF THE ENTERPRISE.

a) Land Use and Crops

One of the most interesting findings of this survey was that almost all the sheep owners in the sample owned and/or rented land for crop production. This is contrary to the widespread concept of the "landless shepherd of Cyprus". In the recently completed wheat and barley study [+] the same fact was revealed.

The general land use features are summarized in table 3. No information was obtained on the fragmentation of holdings since it was assumed that there would be no significant difference with the findings in the wheat and barley report.

Table 3

Features of land use by herdsize groups

Crops in government donums	A	B	C	General
Wheat	11	12	37	15
Barley	23	29	42	28
Vicos	13	15	35	17
Favetta	3	8	7	5
Other foddercrops	6	6	2	5
Fallow	8	29,	33	18
Total	64	99	156	88
Land owned	41	50	117	54
Land rented	23	49	39	34

It is noted that the average acreage increases almost proportionally with the increase of the average herdsize. The annual averages of the joint sheep and goats flocks were:

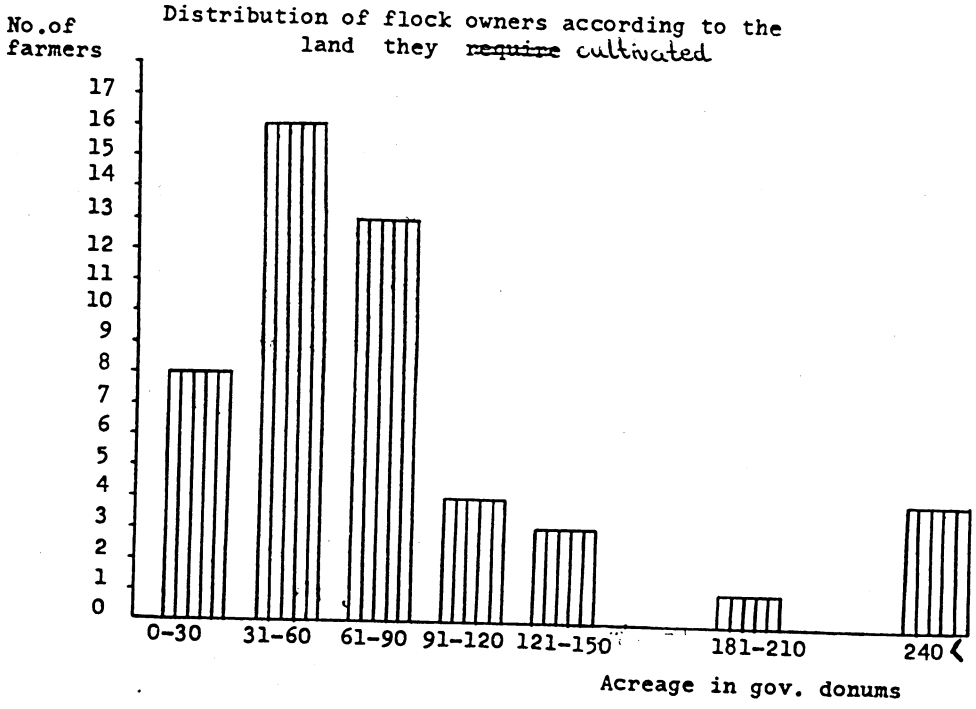
Groups	A	B	C	General
Number of animals	56	70	123	70

[+] Cost and Returns of Cereal Production
Farm Management Report No.2

Averages are of limited value since they only indicate a tendency, and the reader should be aware of the rather wide variation of acreages on the individual farms.

Diagram 2 shows the distribution with a modal value of 31 - 60 government donums.

Diagram 2



As barley and wheat straw are mainly used for animal feed, table 3 indicates that the great majority of the land is used to produce feed for the animals.

Most owners had also some olives and carob trees in the following average quantities:-

Group	A	B	C	General
Number of trees	17	10	42	18

Most of the crop land of the herders was their own but many rented additional land to expand their cultivated area.

b) Other Livestock

No other dairy animals were found on these farms except a few cows. Most farmers had some chickens mainly for home use. The average quantities were:-

Groups	A	B	C	General
Number of chickens	9	29	13	16

The herders in group C had an average of 2 donkeys each, but only a few donkeys were found in group A and B.

c) The sheep flock

Almost without exception all the flocks were of the Cyprus Fattail Breed. This breed has the ability to endure the unfavourable climatic and feeding conditions during certain parts of the year.

In table 4 is shown the flow of the sheep flock during the year 1962/53.

Table 4

Flow of sheep flock from 31.10.62 to 31.10.63

Number of animals	A	B	C	General
at 31.10.1962	39	53	95	49
+ purchased	1	9	3	4
+ transferred from yearlings	7	7	24	9
- sold and home slaughtered	4	10	23	8
- died	3	3	8	3
at 31.10.1963	40	56	91	51

The table shows that there was little change over the period of the survey in the average herd size. The number of purchased animals and the number of yearlings transferred into the herd are nearly equal to the number of animals sold, slaughtered and died.

It is noted, however, that the number of animals sold, slaughtered and died increased more than proportionately with the herd size. Or in other words, the turnover was highest on the larger flocks. The percentages for the three groups were 18, 25 and 33 respectively.

Elaborating on this we have worked out a theoretical case with turnover rates of 20, 25 and 33 percent. We have assumed that the net birthrate per ewe is one lamb and that for replacement purposes 10 percent more lambs are kept than is necessary, thus giving a reasonable selection margin. For reasons of comparison we start in all three groups with a flock of 100 ewes. The repercussions of the different rates are shown in table 5. If we first look at the composition of the flocks we notice that the flock with the 33 percent rate is much younger. In this flock there is very little time to observe the progress of the next generation so that a rational selection of lambs cannot be made from the best performing ewes. In the second place more lambs for replacement are needed in the group with the 33 percent rate. The disadvantage is that the owner has to select 36 lambs out of 50 compared with 22 out of 50 for the 20 percent rate. A much sharper selection can be made with the lower rate. In the third place there is an economic advantage for the 20 percent case. The herder can sell more young animals with a good chance for better prices. In addition he has to look after a smaller number of lambs, which generally require more personal care and better and more expensive feed. Finally a bigger quantity of milk can be sold.

From this example we may conclude that the question of selection and turnover requires a careful reappraisal by many herd owners. In fact a substantial increase in efficient mutton production can only be attained if this problem is resolved. An excellent animal health control and animal nutrition program coupled with careful culling, based on appropriate records, are the basic stepping stones for further improvement of sheep and goat production.

Table 5

Comparison of flocks with different turnover rates

Number of animals	Turnover rate		
	20%	25%	33%
Number of ewes wanted	100	100	100
Ewes of 5 years old	20	-	-
" " 4 " "	20	25	-
" " 3 " "	20	25	33
" " 2 " "	20	25	33
" " 1 " "	20	25	33
Average age of flock in years	3,0	2,5	2,0
Yearlings for replacement	20	28	36
Ewes for sale	20	25	33
Yearlings for sale	2.	3	3
Lambs for sale	78	72	64

The annual average number of yearlings on the sample farms was as follows:

Group	A	B	C	General
Number of yearlings	13	16	37	17

As compared to the numbers required for replacement as shown in table 4, there was an ample supply of yearlings.

We gained the impression that the size of the flock is perhaps not as static as the figures may indicate. Within limits individual herders adjust their herd size to the availability and price of feed. Hence there is not always a proper balance between culled ewes, available yearlings and lambs kept for breeding. In a drought year the flock might be slightly reduced and in years of plenty it is expanded again. This gives herders a kind of flexibility which crop farmers lack. This flexibility is even greater with regard to their liquidity position. This matter will be further discussed in the next chapter.

Table 6

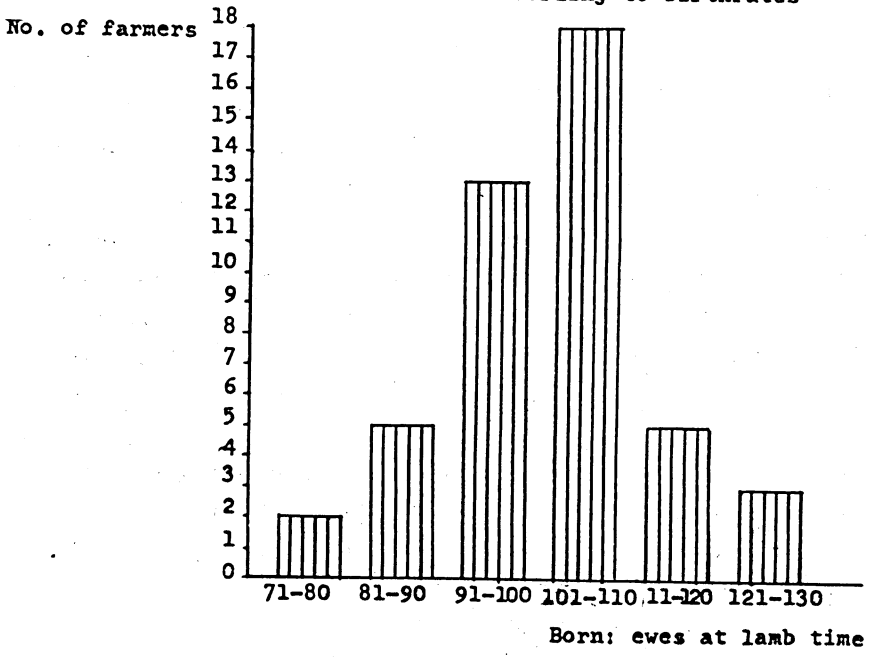
Number of lambs, mortality and birthrates by herdsize groups

Number of lambs	A	B	C	General
Born alive	45	68	134	62
Born dead	1	1	1	1
Number of twins	2	4	4	3
Total died/included still birth	3	3	6	3
Lambs born per ewe	1,01	1,04	1,00	1,02

As shown in table 6 the mortality figures of the flocks were very moderate. Even if the still born lambs are included the average is not more than 5 percent. The average birth rates are quite similar for the three groups, showing a very low percentage of twins. The number of lambs born per ewe are related to the number of ewes during lambtime. Great differences however, occur between the individual herds as is clearly visible in diagram 3.

Diagram 3

Distribution of herds according to birthrates



Looking at the two extreme columns we see that there is a difference of over 50 percent in birthrates. It is obvious from this that many herders can greatly improve this essential management factor.

One last item should be discussed in this section, namely the ratio between ewes and rams.

The average figures were as follows:

Groups	A	B	C	General
Ewes per ram	22	25	24	22

The figures were found by dividing the number of ewes by the number of rams including yearling rams. In a few cases some ewes for other owners were herded with the flocks and those animals might also have been tupped by the rams. This number is negligibly small with an average of only 2 in group A, 1 in group B, and none in Group C.

There were great differences in the ratio of ewes per ram among the individual herds as shown in the following distribution table.

Number of ewes per ram	Number of herds
11 - 15	5
16 - 20	15
21 - 25	11
26 - 30	6
31 - 35	6
36 - 40	3

The normal recommended number of ewes per ram is 35 - 45. The great majority of herds did not meet this standard and spent unnecessary money for the maintenance of rams.

In conclusion of this section we can state that much can be done to improve the composition and quality of the herds. Although the average figures do not show a low number of lambs per ewe it was observed that some individual flocks had a con-

siderable number of ewes without lambs. These low birthrates indicate an inadmissable high percentage of barrenness or an inadequate vitality of the rams (both of which may be caused by inherent defects or poor feeding practices). Better selection coupled with a better feeding program especially before the mating period should certainly bring immediate results. Further detailed research on these matters in cooperation with the animal husbandry department and progressive herders is highly desirable.

d) The goat flock

The same data were collected for goats as for sheep. The number of goats in the flocks is considerably smaller than the number of sheep. We show here only the main data in table 7. The breed is mainly local except in a few cases where the herder had only a few tethered goats of the Damascus breed. In another few cases the herders had Damascus billy goats with their local flocks.

Table 7

Features of the goat flock by herd size groups

Description	A	B	C	General
Goats at 31.10.1962	9	12	12	10
+ Purchased and transferred yearlings	2	3	1	2
- Sold, and slaughtered at home	1	2	-	1
- Died	1	4	2	2
Goats at 31.10.1963	9	9	11	9
Annual average number of yearlings	2	2	5	2
Kids born alive	15	14	15	14
Kids still born	1	-	1	1
Number of twins	5	4	5	4
Total died (included still born)	1	2	2	1
Kids born per goat at kid time	1,56	1,60	1,52	1,56
Goats per billy goat	7	7	10	7

These average figures on goats per flock had little significance. Not every herd had goats and on the other hand a few herds consisted of goats only. The number of goats that died is high as compared with sheep. The mortality rate of kids is not excessive. The percentage of twins is good and influences favourably the number of kids per goat. There is however a great difference in kidding rate between the individual herds, most likely due to the influence of various breeds, as shown in the following distribution table:

Kids per goat	Number of herds
less than 1,10	7
1,11 - 1,30	5
1,31 - 1,50	10
1,51 - 1,70	7
1,71 - 1,90	3
1,91 - and over	10

This wide range indicates that there is very little uniformity in the sample. No doubt some of the animals were cross bred with the Damascus goat. Opportunities for improvement in the kidding rate especially through better selection and better feeding seem to be present under the various husbandry systems practised around the island.

The small number of goats per he-goat is mainly due to the small number of she-goats per flock. In several cases where the herder had only a few goats there was no he-goat and the goats were served by he-goats of other herds. In one flock the ratio of he-goats to she-goats was 1:35 and in another flock 1:45 which is within the limits of the recommended ratio. Since the owners of small herds and many larger herds are generally not inclined to spend extra money for a well bred male animal the establishment of an artificial insemination service may well be the answer to rapidly improve the performance of sheep and goats in the island. While the present distribution of he-goats through the animal husbandry department is

certainly having a favourable influence it still appears to reach only a limited number of sheep and goat owners.

e) Grazing and feeding

As already mentioned almost all herders have a certain acreage of owned land. Besides that they rent land for grazing and use stubble land of arable farmers free of charge. Finally there is land at their disposal which is not being cultivated. The availability of land is shown in table 8. The free land and non agricultural land is commonly shared between a number of herd owners.

Table 8

Grazing land available by herdsize groups

Land in gov. donums	A	B	C	General
Own cultivated	46	83	105	67
Rented	156	326	141	209
Free	797	225	281	537
Non agricultural	625	942	627	729
Total area covered	1624	1576	1154	1542
Radius grazing area in miles	2,3	2,9	2,6	2,6

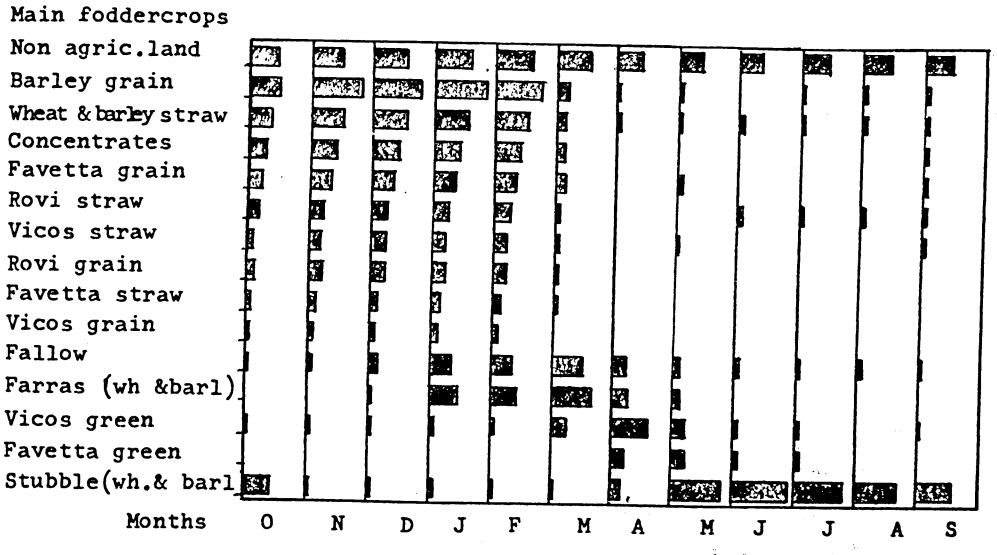
The amount of own cultivated land increased almost proportionately with the size of the herd. This is not so for the land being rented or grazed free of charge. On the contrary the total area covered decreases with the size of the herd. Most probably the bigger flock owners, also being bigger land owners, were in a better position to have their plots better linked together. And therefore they might have been able to reduce the number of herders with whom they had to share the free land.

This indicates that grazing is not very efficiently organized. Herders with smaller flocks more easily cover a larger area than those with the bigger flocks.

Grazing practices in the surveyed area are roughly as follows: In January herders start to graze their flocks on the natural green vegetation of the fallow land and end in April or early May. At the same time barley farras and a little bit of wheat farras is used during the first three months of the year. Green vicos and favetta is grazed in April and May. In May the green feeding period ends and the flocks go on barley and wheat stubble land on which in most cases all the straw is left unharvested. This grazing continues till the middle of October. At the end of September the herders start feeding barley grain, favetta, vicos- and rovi seed mixed with chopped straw. This grain feeding continues till the end of February and overlaps with the grazing on farras and fallow land. The flocks are grazed on non agricultural land the whole year round with the highest intensity in the first three months of the year when natural pasture is plentiful after the winter rains. Diagram 4 gives a visual impression of the grazing practices.

Diagram 4

Distribution of foddercrops over the months of the year



In this diagram the main fodder crops are mentioned. In addition to these crops shepherds graze their herds on tobacco leaves, cotton leaves, tomatoes, carrot leaves, potato leaves, cabbage leaves, melons and just about anything edible.

The distribution of the feed over the year was recorded for each herder. In cooperation with the agronomy section okes of dry matter for all the crops were calculated. The same was done for straw, concentrates and other feeding stuffs. In this way the okes of dry matter supplied per month could be calculated. It should be noted that dry matter requirements alone do not give a complete picture of feeding requirements. In addition the total digestable nutrients should be measured, however our data were inadequate to make this refinement.

These calculated supply data were compared with the requirements of the different kinds and age groups of animals. The latter information was supplied by the animal Husbandry Department. The confrontation of the two series of figures was most interesting. We have taken here arbitrarily the figures of one herd. For each month the supply was divided by the requirement and expressed as a percentage. The figures from November until October were as follows:

N.	D.	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.
66	83	181	158	146	540	558	1109	561	16	51	94

Five months show a deficiency in feed supply and seven months a surplus. The deficiency may have been compensated by the use of non agricultural land and free grazing land, which had not been included in the supply calculations. More serious however, is the surplus. Since in May, June and July most supplies are based on stubble, which also might have been shared with other herders, the actual feed surplus is certainly much lower. Although our figures are only rough approximations they certainly indicate that there was a considerable waste of feeding stuffs during certain periods of the year. Part of this waste is caused by trampling down by the flock. It is a well known fact that a crop can be

trampled down severely by simply running a flock of sheep over it.

The high percentages in May, June and July are primarily due to the abundance of straw in the field but most of this is crushed under the feet of the animals while only a minor part is eaten. The average percentages of all flocks are shown in table 9.

Table 9

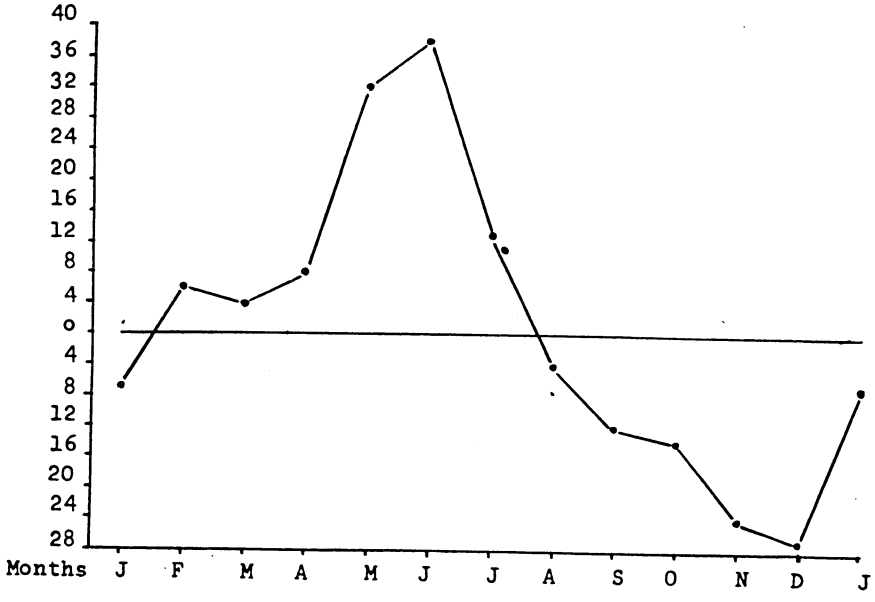
Relation between monthly drymatter supply and drymatter requirement by herd size groups

Month	A	B	C	General
November	73	73	167	85
December	65	82	165	84
January	98	128	90	107
February	137	226	163	169
March	131	150	134	138
April	190	120	201	169
May	375	936	338	553
June	667	779	275	653
July	300	217	90	246
August	187	104	72	145
September	154	93	89	126
October	149	78	58	114

When looking at the General average only November and December show a slight deficit in supply. For that reason a frequency distribution was made of all the herds which simply showed for each of the twelve months of the year whether there existed a surplus or a deficit disregarding the extent of it. On this basis we arrived at diagram 5 in which the balance is shown between feed supply and feed requirements for all animals per month.

Diagram 5

Balance of herds having a feed shortage or surplus during the months of the year



In our opinion this diagram reflects quite well the general situation. Unfortunately our data are not sufficient to allow us to draw more detailed conclusions. No doubt the feed supply of the non agricultural and free grazing land has a favourable effect on the above picture. Some herds in the Paphos district appear to rely almost entirely on free grazing. However, when the feed supply was partly obtained from own cultivated and rented crops and partly from free grazing land we could not properly evaluate the feed supplies of the latter, and merely assumed that the grazing efficiency in most cases must have been extremely low. Several herd owners mentioned that areas rented are only used for a quick first grazing and then become free grazing land.

The feeding of milk to lambs and kids was estimated on the basis of the milk production per animal as given by the herder and the number of days the animals were suckled. Relative-

ly big quantities of milk went to the sucklings. On average the animals were suckled for almost 2 months at an estimated rate of $\frac{1}{2}$ oke per day. According to investigations of the Animal Husbandry Department and experiences elsewhere the rate of $\frac{1}{2}$ oke is insufficient. Hence our estimate has been altered into $\frac{3}{4}$ oke. Most probably herders based their estimate on the actual quantity they milked after weaning. But they will never be able to get the same quantity of milk as the lambs and kids get with suckling. Due to the differences in length of suckling and total milk production the percentage of total milk production going to lambs and kids varies widely. The distribution of the percentages is as follows:

Percentage of total milk for lambs and kids	Number of herds
11 - 20	1
21 - 30	4
31 - 40	4
41 - 50	14
51 - 60	10
61 - 70	7
71 - 80	4
81 - 90	3
91 -100	2

About half the herd owners fed between 40 and 60 percent of the total milk production to the young animals and about $\frac{1}{3}$ of the herd owners fed even more of the milk, with some as much as over 90 percent. It appeared that especially the group with the bigger flocks feeds the highest amounts. Their suckling period is longer with less emphasis on milking. Also their milk production is somewhat lower. The average suckling time for the three groups was as follows:

Group	A	B	C	General
Suckling days	55	58	70	58

There was almost no difference between the average number of days for lambs and kids.

The suckling time can no doubt be considerably shortened. This is highly desirable in view of the high price of sheep and goat milk especially during that period of the year. There are various possibilities, for instance, earlier weaning and creep feeding, or by partial suckling after the first month, admitting the sucklings to their mothers only during the night and creep feeding during the day. Perhaps most economical is feeding the new born animals after a few days completely on cheaply imported milk replacer. Obviously milking requires large amounts of trained labour. It appears that the larger flocks are moving away from milking, likely caused by increasing labour problems. No doubt the introduction of machine milking could make an important improvement in this situation.

f) Production of milk, wool and manure

In all the mixed herds the milk of sheep and goats was mixed together and no production per ewe or goat could be calculated separately. We had no other choice but to take for these herds the same average production for both sheep and goats, although the milk yields of goats are generally higher. The averages for the groups computed for sheep and goats were as follows:

Group	A	B	C	General
Milk per ewe in okes	86	81	83	84
Milk per goat in okes	91	82	83	87

There is a wide variation in milk production among herds as given below:

Milk production intervals	number of herds	
	sheep	goats
41 - 50	1	1
51 - 60	5	4
61 - 70	10	7
71 - 80	6	6
81 - 90	7	6
91 - 100	3	4
101 - 110	6	4
111 - 120	3	3
121 - 130	3	5
131 - 140	1	1

This distribution table indicates that there is great promise for the future in selection for higher milk production, especially if one realizes that there are also great differences within the flocks.

The destination of the milk is shown in table 10. "Sold otherwise" is generally the sale to one of the neighbours who uses the milk for cheesemaking, drachana, etc. The milk for home use, usually for making yoghurt, is negligibly small. The biggest quantity is used for lambs and kids. Another important quantity is used for making halloumi and anari at home.

Table 10

Destination of milk by herd size groups

Destination in percentage	A	B	C	General
To one cheesemaker regularly	23	30	26	26
Sold otherwise,	10	3	2	6
Home use	2	1	1	1
Lambs and kids	54	51	64	55
Halloumi, etc.	11	15	7	12

The wool production in okes per fleece was for the groups as follows:

Group	A	B	C	General
Okes of wool per fleece	1,18	1,46	1,46	1,33

The extremes in the whole sample were 0,42 and 2,74. Even though these figures may not be completely reliable, we may assume that the variation is from one to two okes per fleece. This again would indicate that there is much room for improvement through selection in many herds.

The only other product of sheep and goats for sale is manure. The average production of manure per head is 0,15 to 0,20 ton which is sold at high prices as will be seen later.

g) Labour requirements

Sheep and goat herding in Cyprus requires large amounts of labour. One may say that herding a flock is not very tiring but the herder is with his flock from early in the morning until late in the evening. In table 11 are shown the average labour data for each group. On the average herders spend 51 hours for herding per animal per year. It is not surprising that the number of hours of the small group is higher due to the fact that the work is almost the same for a small as for a large flock. But the trend between A and B does not hold between group B and C. This indicates that there is a limit above which proportionally more labour is required. If we consider the individual herds there is some variation in hours but a great number are concentrated around the averages.

Table 11

Average labour data by herd size groups

Description	A	B	C	General
Shepherding hours per animal	59	40	39	51
Milk in okes per hour milking	3,1	3,9	2,4	3,2
Cheese in okes per hour cheese-making.	1,0	0,9	1,1	1,0
Man hours in % of total hours	76	75	64	74
Own man hours in % of total man hours.	96	92	82	93
Own woman hours in % of total woman hours	99	97	100	98
Family man hours per man per year	4683	4326	4623	4558
Family woman hours per woman per year	1866	1340	2875	1838
Boys over 12 years of age	0,3	0,5	0,6	0,4
Girls over 12 years of age	0,4	0,5	0,6	0,4

The data showed that on the average 3,2 okes of milk are produced per milking hour. With twice a day milking this means 6, 9 and 13 animals per hour with daily yield of respectively 1, $\frac{3}{4}$ and $\frac{1}{2}$ oke per head. We found that 4 to 6 hours were spent on

milking daily during the milking season. It took one hour to make one oke of cheese which does not seem to be a very efficient operation. This high labour requirement is mainly due to the fact that small quantities of milk made into cheese require almost the same amount of labour as bigger quantities.

In spite of this the economic results from cheese making to be discussed in the next chapter, are quite favourable.

As shown in Table 11, herding is mainly an occupation of men. The woman hours are principally spent in the yard Only a small amount of labour is hired. As the flock grows larger somewhat more labour is hired but even then it is still rather insiginificant. The hiring of women is a negligible amount of 2 percent on average.

Special attention should be given to the family manhours per man per year. In contrast with the man hours utilized in arable crops[+] we find here that the family is fully occupied throughout the year. Even if we assume that boys lend a hand to the herder the number of hours per man is very high. For the three groups, they were 3600 for group A, 2880 for B, and 2880 for C. This means 8 to 10 hours every day of the year. The same kind of calculation made for the own women hours gives us 1330 890 and 1800 for the three groups respectively which shows that especially the wives of herders with large flocks must be very busy indeed with this and their household duties. Although the difference is small we observe a small increase in help from boys and girls as the flock size increases.

[+] See Farm Management reports 1 and 2 on tobacco and Cereals

IV. PRICES AND ECONOMIC RESULTS

a) Prices of Products

The average prices received for the products of this enterprise are shown in table 12.

Table 12

Prices of the products of the enterprise by herd size groups

Selling price in mils	A	B	C	General
Milk per oke	101	103	101	102
Halloumi per oke	644	650	675	652
Anari per oke	175	200	400	219
Ewes/per head	4400	6000	6400	5300
Yearlings/per head	8100	7600	8000	7900
Lambs/per head	4500	5000	4300	4600
Rams/per head	8500	16500	11000	12200
She-goats/per head	5100	8000	6000	5800
Yearlings/per head	6400	6900	4500	6200
Kids/per head	4800	4400	5000	4700
He-goats/per head	8500	11100	9000	9600
Wool per oke	290	281	287	287
Manure per ton	2000	2800	-[1] 1) no records	2300

The milk price centers around 100 mils per oke. The distribution is as follows·

Price intervals in mils	Number of herds
90 and less	2
91 - 95	4
96 - 100	20
101 - 105	10
106 - 110	7
Over 110	5

These different prices are not based on difference in quantity or fat content but are more influenced by the availability of marketing outlets. Some influence was exerted by the amount of goat milk mixed with the sheep milk. However, our information is inadequate to analyse the real price determining factors. Further detailed research is needed here.

The halloumi price of the individual herders ranges from 12 to 14 shillings per oke. Only 21 out of 49 herders sold some halloumi. Part or all of it is kept for home use. The percentages for anari for home use are even higher as shown below:

Percentage kept at home per group	A	B	C	General
Halloumi	77	62	71	71
Anari	94	75	92	88

Only 8 out of the 49 herders sold some anari. The price ranged from 3 to 5 shillings with one exception of 8 shillings in group C.

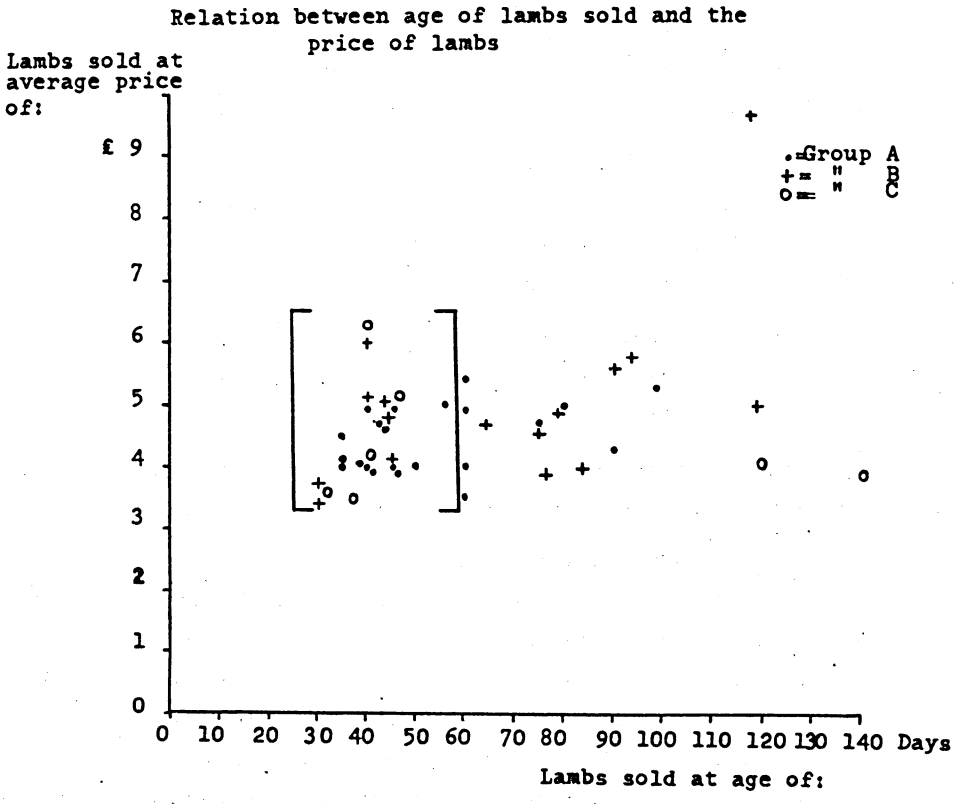
Turning to the average prices of ewes we notice that group A received considerably lower prices than group B and C. This might be partially due to the lower culling rate of group A. The culled ewes in group A would be older than in group B and C. The very high price of rams in group B has no special significance since it is based on the sale of only 2 rams. Much attention was given to the prices of lambs. Although the averages of the groups do not show a great difference a great variation in prices among individual herders was noted. The distribution of the herds according to lamb prices was as shown below:

Average lamb price in £	Number of herds
3,1 - 4,0	18
4,1 - 5,0	20
5,1 - 6,0	5
6,1 - 7,0	1
over 7,0	1

An effort was made to find the main factors influencing price. It was reasonable to assume that the age at which the lambs were sold had a great influence. For this reason we related the age of the

lambs with the prices received as shown in diagram 6.

Diagram 6



Considering the lambs sold at less than 60 days a significant regression indicated that the average price increased with 78 mils per day. If the animals were daily fed with $\frac{3}{4}$ of an oke of milk worth 75 mils it just breaks even.

After 60 days a regression coefficient representing a price increase of 18 mils per day was found. This coefficient was rather insignificant. However the price increase just counterbalanced the cost of a barley feeding. No doubt quickly growing animals gave better financial results.

There are also seasonal price variations but our information was not detailed enough to determine an average seasonal price pattern for different ages of animals. We had only the average price of the lambs sold at different times of the year. A more detailed marketing study both on feeding and on marketing is highly desirable.

Since we may assume that a lamb can gain 1 oke of weight in 10 days, which costs not more than 3 shillings of feed and one oke of liveweight can be sold at 5-6 shillings, it can readily be seen that this does not correspond with our findings. Prices per oke apparently drop very rapidly as the lambs get over two months of age. A careful study of this matter is called for since we believe that good production potentials are badly wasted.

The same observations are valid for goats. Prices of kids vary even more than those of lambs as will be shown below:

Average kid price in £	Number of herds
2,0 or less	2
2,1 - 3,0	4
3,1 - 4,0	10
4,1 - 5,0	7
5,1 - 6,0	1
6,1 - 7,0	5
7,1 - 8,0	2
8,1 - 9,0	1

Kids were sold at as young an age as lambs. Nine were between 1 and 2 months. Ten between 2 and 3 and 9 between 3 and 4 months. Only four reached an age between 4 and 5 months.

The wool price is low but the quality of the wool is low too.

The manure price is almost identical to the market value of the nutrients it contains. One ton of manure has,

7.5 kg of pure	N_2	@ 95 mils	=	£ 0.713
10.0 kg " "	P_2O_5	@ 65 mils	=	£ 0.650
20.0 kg " "	K_2O	@ 50 mils	=	£ 1.000
		Total		£ 2.363

We have not given any value to the organic matter content but considering the value above we doubt that it is prudent to sell the manure especially when herders have a plot of irrigated land.

b) Economic results of the sheep enterprise

The determination of the economic position of the herders was the main aim of our study. Non-economic information was collected in order to give the necessary technical background.

The cost and return data are expressed per ewe and per goat, this being the best measure in animal husbandry studies. A full breakdown of the cost and return per group is given in table 13.

Table 13

Cost and return per ewe/goat in mils by herd size groups

	A	B	C	General
Buildings	108	164	56	119
Draught animals	35	27	39	33
Interest of capital in flock	720	742	846	745
Feeding stuffs	5489	6186	5291	5688
Milk for lambs and kids	4710	4202	5380	4640
Miscellaneous	132	209	131	157
Total cost (excluding labour)	11194	11530	11743	11382
Returns milk	8893	8747	8447	8781
meat sales + increased value of flock	4706	4390	5644	4736
wool	355	414	405	381
manure	375	459	328	396
herding for others	143	60	0	96
Total returns	14472	14070	14824	14390
Labour return	3278	2540	3081	3008
Labour return per manhour	31	38	43	35

The most important cost factor is feeding stuffs. For a good comparison not only the purchased fodder crops, grains and the like are included but also an estimated value for the home-grown products.

The two composing factors are on the one hand the fodder crops including straw, stubble and fallow, and on the other hand the grains, other seeds and concentrates. As it is very difficult to determine the total feed value of straw and fodder crops such as farras and fallow only the total averages of these crops are shown. For each cost interval of feeding costs in table 14 the acreage of own and rented grazing land per head is determined and the average cost of grain and concentrates.

Table 14

Distribution of herds according to feeding costs with the related averages of acreage of roughage and grains and concentrates per ewe/goat

*Intervals in mils	Number of herds	Average acreages, roughage in gov.don.	Average grain and concentrates in £
0 - 2000	5	19	0,3
2001 - 4000	8	160	1,4
4001 - 6000	10	233	2,2
6001 - 8000	18	402	2,6
8001 - 10000	5	225	4,4
10001 - 12000	3	512	4,8

As expected, there is a positive relationship between the series of figures. There is of course always the possibility of substituting grain for fodder crops and some indication of that may be observed in the interval 6001-8000 as compared with 8001-10000. We see for instance that the acreage in the first mentioned interval is high and that the amount in the next interval falls below the trend. The reverse position we notice in the last column where £ 2,6 represents 35 % of the total feeding costs while £ 4,4 represents 50 %. There are

some plausible explanations for the wide variation among groups or individuals. The interval with less than £ 2 cost consists mainly of herders in the Paphos district, who had no grain costs at all and occupied only a few donums of own land. They depended for grazing completely on free grazing land and non agricultural land. Although the earlier mentioned calculations of surplus or deficiency in dry matter are not refined enough to draw conclusions on feeding efficiency it is still interesting to note that the number of months with surplus feed increased with the increase of feeding costs. For the interval 0-2000 in table 14 on the average only 2 months showed a surplus, for the interval 2001-4000 this was four increasing to 5,6,8 and 9 respectively for the other intervals. Generally speaking the flocks do not starve and hence we have to conclude that the herds with low feeding costs collect considerable quantities of feed from free grazing land and uncultivated land.

The next important cost item is the milk fed to lambs and kids.

We could have left this out completely and in turn not have shown the returns for milk fed. However its inclusion shows more clearly the technical process in the enterprise. If feeding stuffs and milk are totaled there is very little difference in costs between groups A, B and C amounting to 10199, 10388 and 10671 respectively. The variation of milk feeding cost is as follows:

Milk feeding cost per ewe/goat in mils	number of herds
2001 - 3000	9
3001 - 4000	8
4001 - 5000	14
5001 - 6000	9
6001 - 7000	6
7001 - 8000	-
8001 - 9000	1
9001 - 10000	2

The wide variation and the high amounts computed for milk feeding raises the question of the economics of earlier weaning.

Although one should be aware that hand-milking twice a day will not give the same milk yield as obtained from suckling it is still very worthwhile to do more detailed study on this aspect, especially with the presently prevailing milk prices.

The interest charged against the capital in the flock is a rather important item. Of course the herders consider this as part of their income. An interest rate of 6 % was charged on the average annual invested amount.

The costs of buildings and draught animals include interest, depreciation, maintenance and repairs. Miscellaneous costs consist of veterinarian, drugs, water, tax, rural constables and tools.

The main source of income is milk. As the size of the flock increased the return per head decreased, mainly because of lower milk production per ewe and goat, as already discussed under (f) in the previous chapter. Efforts to raise the milk production per animal should have a favourable effect on this main return item.

The returns for meat of group C either in the form of sold animals or in increased value of the herd is considerably higher than the two other groups mainly because the herders sell relatively more young ewes and less lambs. Returns for wool are very low representing only 3 % of total returns. Considerable improvement should be possible in this respect. The amounts of manure sold per head are not fully comparable as some farmers used a part on their own land. Again returns are not very important.

"Herding for others" is the compensation for herding some animals for other owners. It is a negligible amount and was only done by the smaller flockowners.

Since no labour was included in the various cost items the difference between the returns and costs is the labour return per ewe or goat. On the average labour returns amounted to three pounds per head.

There is a great variation in the labour return among individual herds. Table 15 gives the distribution per group and in total.

Table 15

Distribution of herds according to labour return per ewe/goat by herd size groups

Intervals in £	A	B	C	General
- 4 to - 2,1	2	1	-	3
- 2 to - 0,1	2	1	-	3
0 to - 2,0	5	3	2	10
2,1 to - 4,0	7	5	3	15
4,1 to - 6,0	4	4	2	10
6,1 to - 8,0	4	1	-	5
8,1 to -10,0	2	1	-	3
Total	26	16	7	49

Only 6 of the 49 herders in the sample showed negative labour returns. No doubt their income position is very bad. If they have their own capital then the interest **charged** against the flock and other investments is actually income. Yet this does not equal or exceed the negative amounts, It is noted that group C is more concentrated around the modal and mean return. This may indicate more stability and less variation in management. In general the table shows a normal and very regular distribution.

The average return per labour hour is low but owing to the high output of hours per man the income is reasonable especially when compared with the results of the studies of tobacco and wheat and barley.+ The return per hour of the individual herders shows the same regular distribution as the return per ewe/goat.

+ See farm management reports No. 1 and 2.

Return per hour in mils	Number of herders
negative	6
0 - 20	11
21 - 40	12
41 - 60	12
61 - 80	5
120	3

Due to the fact that the owners of larger flocks handle more animals per man, their return per hour is somewhat higher.

Improvement of the return per hour can be obtained primarily in three ways:

1. Increasing the number of animals per man especially when grazing can be done in confined areas.
2. Efficient grazing and feeding and better marketing will decrease cost and increase returns.
3. Effective breeding, keeping records on individual animals and selection will lead to higher production per head and better financial returns.

c) Economic returns of cheesemaking and costs per oke of milk

Although cheesemaking is principally done in a primitive way, it is still a lucrative business. Returns exceeded costs even if 1 man hour was charged at 100 mils and a woman hour at 50 mils. The ratio return: costs for the group A, B and C were 103, 112 and 106. In only 10 cases total costs including labour, were not completely covered by returns. Under the present price relations it is therefore not advisable for the herders to stop their own cheesemaking and deliver all the milk to the cheese factories.

If labour in the sheep enterprise were charged at the same rate as in cheesemaking the average cost of production of one oke of milk would be as shown in table 16.

Table 16

Cost of production in mils per oke of sheep/goat milk by herd size groups

Cost items	A	B	C	General
Buildings - draught -				
Animals and miscellaneous	4	5	3	4
Interest on investments in flock	9	10	11	9
Labour	133	94	81	113
Fodder crops, grains, etc.	68	75	67	70
Milk for lambs and kids	55	53	67	56
Gross cost	269	237	229	252
Meat value	57	60	73	60
Wool, manure and herding for others	11	11	9	11
Total subtraction	68	71	82	71
Net total cost of production/oke	201	166	147	181
Cost of production (exl. labour)/oke	68	72	66	68

The table shows how in cases where there are several products, (here milk, mutton, wool and manure), the cost of the main product is determined. It is assumed that the sale value of the other by-products just covers their costs, hence when we subtract their value from the total cost, the net cost of the main product remains. When the net total cost is compared with a milk price of approximately 100 mils/oke it is obvious that the price does not cover the cost. When we leave the labour cost out we get the cost per oke excluding labour. At a milk price of 100 mils the labour returns per oke is then 32, 28 and 34 mils for group A, B and C respectively.

d) Spendable income position

As previously mentioned, due to the great number of working hours the yearly income of the shepherds is quite reasonable. Table 17 gives a full display of all the factors which influence the ultimate spendable income of the herders. The item investment or desinvestment in the flock deserves some further explanation. It is primarily concerned with the change in inventories during a year period. When a flock consists of 50 ewes at the beginning of the year and 60 by the end of the year then the value of 10 ewes is actually invested out of the income made during the year. In the reverse situation the herder has cash in hand which is actually no income but a selling of capital. In the previous chapter we already touched on this matter with regard to its effect on the financial position of the herder. In good years he reserves part of his income by expanding the flock, in bad years he sells extra animals and consumes his reserves. In this way his financial position maintains flexibility.

Table 17

Spendable income position of the herders by herdsize groups

Income items in £	A	B	C	General
Net cash sheep and goats	236,0	281,1	521,1	291,5
Net cash cheesemaking	16,4	75,8	15,8	35,7
Subtotal	252,4	356,9	537,3	327,2
Net cash income cash crops,etc.	31,4	47,5	109,0	47,7
Other occupations	22,2	0,6	0,0	12,0
Minus investments	- 25,7	- 37,6	-131,7	- 44,7
Minus cash expenditure fodder-crops	- 36,4	- 45,8	- 41,8	- 40,3
Minus cash rent for land	- 24,0	- 52,0	- 40,1	- 35,4
Minus estimated cash interest and instalments	- 26,2	- 37,7	- 35,1	- 31,3
Net spendable cash income	193,7	231,9	397,6	235,2
Home used sheep and goat product	60,0	59,5	78,2	62,4

As shown in Table 17 all groups had actually expanded their herds during the year 1962-63. Hence a small part of their actual income was invested in animals and not spendable.

When the total net cash income from the flock and from cheese-making is related to the annual average number of ewes and goats of respectively 52,66 and 109 for the groups A, B and C, we find that the average net cash per animal is approximately £5.

The net cash income from crops was estimated by the herder. Most of this was income from wheat. Under other occupations we find the remuneration for herding of animals of other owners. Several herders had borrowed some money chiefly on a short term basis, which accounts for the interest and instalments. The following frequency table shows how many herders borrowed money.

Credit term	Group A	B	C	Total
Long	3	1	1	5
Medium	2	4	1	7
Short	22	14	5	41

In table 18 the average amount of money borrowed per herder is shown, including those who did not borrow any money at all. For instance if 5 herders out of the 10 borrowed together £1000 then the average is £100.

Table 18

Average amount of money borrowed and interest rates charged by herd size groups

Money borrowed in £ and interest %	A	B	C	General
Long term 10 years	25	6	71	25
Medium term 1-10 years	21	109	17	49
Short term 1 year	255	212	359	256
Interest long term credit	6,7	9,0	5,0	6,8
Interest medium term credit	7,0	7,2	9,0	7,3
Interest short term credit	7,9	6,9	7,4	7,6

The money was borrowed from cheesemakers, factories, food-suppliers, relatives, merchants and co-villagers. Several herders borrowed from more than one person. One herder borrowed from 6 persons paying 9% interest to five of them.

As the herders have to pay interest and instalments on the medium and long term credit, these amounts were subtracted from the available cash money. This then resulted in the amount spendable by the family. In addition value of the products consumed at home can be added to the income.

e) Comparison of herders with good results

The comparison of a high income group with a low income group may give some important pointers in management.

As a criterion for good or poor we chose the return per sheep or goat. The group with good results included 18 herders with a return per ewe/goat ranging from 4 to 10 pounds. The group with poor results included 16 herders with a return per head from minus 4 pounds to 2 pounds. A medium group consisted of 15 herders with returns from 2 to 4 pounds per head.

The first and most important observation was a difference between the groups of about three pounds in the cost of feeding stuffs. The farmers in the good group rented less land. They had 5 months with a dry matter surplus and the poor group 7 months, so it is obvious that the good group relied to a greater extent on free grazing land.

There was no significance in difference in prices paid for the fodder crops. On average the herders paid £3,3 per gov.d. of farras; £0,160 for a donum of stubble; £0,640 for fallow per donum and £2 for vicos and favetta. There were great differences mainly due to the difference in quality of the crop.

The second observation is a 1900 mils higher return in milk. The good group had a yield of 93 okes of milk per head against 76 okes for the poor group. The milk prices were slightly higher

in the good group; namely 102 mils per oke as compared to 100 mils in the poor group. The third important observation is 1400 mils difference in returns for meat production. There was no difference in the number of lambs per ewe but more animals died in the poor group. However, the number of kids per goat was 1,7 for the good and 1,4 for the poor group. The group with good results sold slightly older animals.

Those three main items account for a difference in return per ewe/goat of more than £6. The return per labour hour was on the average minus 2 mils for the poor and plus 69 mils for the good group.

This comparison clearly shows again that grazing management, milk production, birth rates, selection and marketing are the main areas in which considerable improvement is possible.

V. RECOMMENDATIONS

From the study of the different kinds of management two distinctly different types of management emerge.

The first type is that of herding animals with a maximal exploitation of free grazing land. The herder is continuously searching for sufficient feed for his flock. This is his main concern which takes a lot of time and limits the size of his flock. Not so much attention can be given to the achievements of the individual animals. The cost per animal however is minimal so that even low returns give a net labour return to the herder.

The second type of sheep and goat husbandry, and here the word "husbandry" is chosen on purpose, has the primary attention focused on the animals. Land and crops are either owned or rented to meet the feed requirements of the animals. Special attention is paid to maximizing the production per animal instead of minimizing the cost as was done in the first type.

The data seem to indicate that at present the first type is still in a favourable position. However a number of possibilities emerged in this study which will eventually give a great advantage to the second type.

These possibilities are:-

1. Higher milk yields through keeping records of individual animals and selection
2. Higher fertility rates through better nutrition, disease control, records and selection
3. Better feeding through improved grazing management and hand feeding
4. Higher labour efficiency through modern grazing, feeding and milking methods

The first and foremost step would be to get the full support of the sheep and goat breeders associations. They can include these possibilities in their programme. A number of demonstration units

could be set up where progressive herders work out a programme in full cooperation with the Department of Animal Husbandry and the Agricultural Research Institute. The first three possibilities could be immediately put to practice in these units. The realization of the fourth will be more difficult but is not unattainable. A fenced grazing area is required so that herding the sheep and goats is reduced to a bare minimum. Through a fencing system the grazing of crops can be controlled so that a minimum of wastage will occur. The other crucial point is milking. Mechanical milking should be introduced enabling a man to milk several animals simultaneously. This type of husbandry is not designed for the lowest costs but for increased returns per animal and per man and will result in a very desirable family income.

More general it is highly recommended that the government encourages with all available means activities of the sheep and goat breeders associations such as:-

1. Establishment of herdbooks aiming at the improvement of meat-, milk- and wool production.
2. Drawing up the minimum entrance requirements for animals in the herdbook
3. Working out a reliable system to identify the animals.
4. Securing of a reliable progeny registration.
5. Compulsively recording of the milk production of registered- and to be registered animals by testing every fortnight.
6. Publication of results of animals coming up to certain standard requirements.
7. Promoting the sale of young stock descending from parents which have fulfilled the standard requirements.
8. Introducing a premium system for good performance

Sufficient records are a prerequisite for a successful and rapid herd improvement.

The study also indicates that many lambs are slaughtered at an early age. It is doubtful if this is the most economical way of

mutton production. However prices of lambs sold at an older age do not rise sufficiently to cover the feeding costs. As a considerable amount of mutton and other meat is imported an increasing domestic production of mutton is highly desirable to cut imports. Research dedicated to different feeding practices, to mutton qualities and the marketing situation is strongly recommended.

These possibilities are a challenge to herders, extension workers and research people alike. Their realization is basic to the welfare of sheep and goat farmers in Cyprus.