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## SUMMARY

Technical and economic data on hay production were obtained in 1989 from 96 farms located in all major hay-producing zones of Cyprus. The mean operated land was 13 ha, of which 21% was owned by the farmers and 79% was rented. Hay and green fodders occupied 36% of the operated land. Seventy two of the 140 plots studied were planted with cereals, 58 with legumes and 10 with mixtures of legumes and cereals. Labour requirements ranged between 12 and 16 h/ha and were supplied by the farm family. Most of the available labour (92%) was used on the farm, since the majority of these farms (94%) were specializing in livestock production. About 66% of the farms were equiped with own tractors, 29% with mower machines, 30% with rakes, 20% with balers and 47% with trailers. Contract work, amounting to £25 to £55/ha, was used mainly for seedbed preparation, cutting, raking and baling. Variable costs/ha was £122 for cereal hay, £130 for legume and £117 for cereal-legume mixtures. Fixed costs/ha amounted to £102 for cereal hay, £92 for legume and £113 for mixed hay. Total cost was £38.6/t for cereal hay, £55.6/t for legume and £47.9/t for mixtures. After 1984, the average cost of hay/t exceeded the market value of its equivalent grains (497 kg of barley and 90 kg of soya) and therefore, it's production was not economical even for livestock keepers, who turned to cereal grain production. From the national economy point of view, however, it was more economical to produce hay than cereal grains, so the government increased after 1987 the subsidy on hay from £8 to £17/t. This proved instrumental in reversing the negative trends of hay production.

## ΠΕΡΙΛΗΨΗ

Το 1989 έγινε επισκόπηση σε 96 εκμεταλλεύσεις που βρίσκονται στις κύριες σανοποιητικές ζώνες της Κύπρου. Η μέση έκταση της εκμετάλλευσης ήταν 13 εκτάρια από τα οποία 21% ήταν ιδιόκτητα και 79% ενοικιαζόμενα. Ο σανός, αποξηραμένος ή πράσινος, κάλυπτε το 36% της εκμετάλλευσης. Από τα 140 τεμάχια που επισκοπήθηκαν, 72 ήταν φυτεμένα με σιτηρά, 58 με ψυχανθή και 10 με μίγματα. Οι ανάγκες σε εργασία ήταν 12 ως 16 ώρες ανά εκτάριο και καλύπτονταν από την οικογένεια. Η πλειονότητα της διαθέσιμης οικογενειακής εργασίας (92%) χρησιμοποιόταν στην εκμετάλλευση γιατί οι πλείστες των εκμεταλλεύσεων (94%) ειδικεύονται στην κτηνοτροφία. Περίπου 66% των εκμεταλλεύσεων είχαν δικό τους ελκυστήρα, 29% χορτοκοπτική, 30% χορτοσυλλέκτη, 20% μπαλαριστική και 47% καρρότσα. Ποσό £25 ως £55 το εκτάριο πληρωνόταν για εκμίσθωση ξένων σανοποιητικών μηχανημάτων. Το μέσο μεταβλητό κόστος κατά εκτάριο σανού ήταν £122 για σιτηρά, £130 για ψυχανθή και £117 για μίγμα σιτηρού και ψυχανθούς. Το μέσο σταθερό κόστος για τα τρία είδη σανού ήταν £102, £92 και £113, αντίστοιχα. Το ολικό κόστος ανά τόννο σανού ήταν £38.6 για τα σιτηρά, £55.6 για τα ψυχανθή και £47.9 για τα μίγματα. Μετά το 1984, το μέσο κόστος ανά τόννο σανού ξεπερνούσε την αγοραία αξία 497 κιλών κριθαριού και 90 κιλών σόγιας, που ισοδυναμούν με ένα τόννο σανού, και οι κτηνοτρόφοι ήταν απρόθυμοι να παράγουν σανό. Προτιμούσαν να αγοράζουν συμπυκνωμένες τροφές που επιδοτούνταν. Επειδή από πλευράς εθνικής οικονομίας συνέφερε η παραγωγή σανού, η κυβέρνηση αύξησε από το 1987 την επιδότηση στο σανό από £8 σε £17 το τόννο. Το μέτρο αυτό επανόρθωσε τη μειωτική τάση της παραγωγής σανού.

## INTRODUCTION

The loss of the central plains in 1974 accentuated the roughage deficit in Cyprus. Total roughage requirements for ruminants and other animals in 1983 were estimated at 216,877 t dry matter (DM), of which only 187,000 t are annually produced and utilized. The roughage consumed by the animals covered only 35% of the requirements in metabolizable energy (ME) and about 32% of the crude protein (CP) needs. The balance was supplied by a total of 226,000 t of concentrates, of which 82% was mostly imported barley grain (Economides, personal communication).

In the years that followed, the situation became even worse due to substantial increases in the animal population and the decrease of arable land, brought about by the

rapid development of tourism and industry. The entire production of milk, beef, lamb and kid meat, plus 30% of the maintenance needs of all ruminants are covered by imported feeds and only about 70% of the maintenance needs are covered by locally produced roughages (Economides, 1990).

Hay, being one of the best forms of roughage, is a must for the expansion of the ruminant sub-sector and the maintenance of healthy stocks, because it can be utilized whenever and wherever needed. In order to further encourage hay production the government decided in 1987 to increase the subsidy on hay from £8 to £17/t.

The objective of this study was to assess the hay situation in Cyprus in the context of the total roughage requirements for ruminants and estimate the costs of production of various types of hay.

## BACKGROUND INFORMATION

Forage supply is a major constraint for ruminant production in Cyprus. To increase the quantity of forage production, pasture development and hay making were promoted. The pasture development project aims at expanding forage production by utilizing marginal lands, improving pastures and extending the grazing period. It has been promoted *via* financial assistance and food rations. The hay making project (started in 1966) aims at encouraging livestock keepers to produce their own hay. The means for achieving the objectives of the project are:

a) demonstration of better methods of handling, utilizing and storing hay,

b) issue of loans for the purchase of haymaking machinery, and

c) provision of subsidies for the erection of hay sheds and the production of baled hay.

The existing subsidy system for cereals favors feed grains and the producers find it more economical to produce barley grain rather than hay. From the national economy point of view it is more economical to produce legume hay than barley grain or cereal hay (Anonymous, 1987; Economides, 1988). Hay production in 1989 was 36,300 t DM (of which 78% subsidized) and accounted for about 18% of the total roughage production (Anonymous, 1990; Economides, 1990).

In 1989, the subsidy paid for stacked baled hay was £17/t compared to £8 in the period 1978 to 1988. During the period 1980-89 the area devoted to hay production averaged 10,680 ha and the hay produced fluctuated between 20,000 and 38,000 t. The quantity of hay inspected and subsidized for the period 1978-89 appears in Appendix Table 1, while the area, production and productivity of the various types of hay inspected are shown in Appendix Table 2. About 39% of the subsidized hay was produced by cattle owners, 56% by sheep and goat owners and only 5% by non livestock owners (Appendix Table 3). Cowkeepers produced mainly vicos (59%), oats (26%), mixtures (12%) and barley (3%). Sheep and goat keepers produced vicos (86%), oats (9%) and mixtures (5%).

To alleviate the roughage deficit the following measures have been suggested: a) continue the subsidy on hay in order to increase its production by using more land and increasing production per unit area, b) substitute the production of barley grain by barley hay in areas with large populations of livestock, c) introduce irrigated fodders in rotation with vegetables, d) increase the quantities of baled cereal straw and improve its quality with ammonification e) fully exploit agro-industrial by-products and gradually utilize poultry manure, f) provide incentives for the utilization of natural vegetation, g) educate livestock keepers on aspects of balanced feeding, h) implement proper culling of unproductive animals, i) optimize the slaughter age and/or weight of animals, j) prevent and control livestock diseases and k) determine the size of the herd/flock according to roughage availability (Economides, 1985).

## RESEARCH CONDITIONS

Data relating to the cost of production of various types of hay were collected from 96 farms by personal interviews, using specially designed questionnaires. The farms were located in five major hay-producing agricultural zones, (Nicosia and Larnaca Mixed Farming, Larnaca and Limassol Coastal and Kokkinokhoria), and represented 4.4% of all hay-producing farms in the country (5.5% of total hay production). Out of the 140 plots studied, 72 were planted with cereals, 58 with legumes and 10 with mixtures (legumes

and cereals). The respective area for the three types of hay were 116, 91 and 24 ha.

A three-stage stratified sampling procedure was followed in order to obtain the required sample (Papayiannis *et al.*, 1983). At the first stage, the major hay-producing areas, representing about 80% of the entire hay production, were grouped into five zones as above. At the second stage, 20 villages, considered representative of their respective zones, were selected. At the third stage, a sample of hay producers were randomly selected from each group of villages taking into consideration their willingness to provide detailed and accurate information (Appendix Tables 4 and 5).

## RESULTS

### Family structure

The age of hay-producers averaged 50.8 years, with an average formal education of 6.3 years. The average family size was 6.1 persons, of which 2.2 children lived off-farm and only 1.9 children and the parents were living on the farm (Table 1).

**Table 1.** Family structure and employment

| | | |
|---|---|---|
| No. of farms | 96 | |
| Farmer's age (years) | 50.8 | |
| Farmer's education (years) | 6.3 | |
| No. of children | 4.1 | |
| No. of children living on-farm | 1.9 | |
| | weeks/year | % |
| On-farm employment | 62.6 | 91.8 |
| Farmer | 46.7 | 68.5 |
| Wife | 15.9 | 23.3 |
| Off-farm employment | 5.6 | 8.2 |
| Farmer | 4.8 | 7.0 |
| Wife | 0.8 | 1.2 |
| Total employment | 68.2 | 100.0 |
| Farmer | 51.5 | 75.5 |
| Wife | 16.7 | 24.5 |

### Factors of production

**Land ownership and land use.** The mean operated land was 13.0 ha, of which 21% was owned by the farmers and 79% was rented. About 50% of the producers paid up to £75/ha, 22% between £75 and £110/ha and 3% above £110/ha as rent. About 95% of the farm land was under annual rainfed crops and only a small part was under irrigation. Hay and green fodders were taking up about 36% of the operated land. The ratio of hay to green fodders was 70:30 (Table 2).

**Table 2.** Area of rainfed hay, green fodders and livestock numbers by farm

| Item | Area | |
|---|---|---|
| | Ha | (%) |
| Rainfed hay | | |
| Vicos | 1.0 | 21.3 |
| Barley | 1.1 | 23.4 |
| Oats | 0.8 | 17.0 |
| Mixtures | 0.4 | 8.5 |
| Total | 3.3 | 70.2 |
| Green fodders | | |
| Vicos | 0.1 | 2.1 |
| Barley | 1.2 | 25.6 |
| Oats | 0.1 | 2.1 |
| Total | 1.4 | 29.8 |
| Grand total | 4.7 | 100.0 |
| Livestock (No/farm) | | |
| Dairy cattle | 20.3 | |
| Sheep & goats | 74.4 | |
| Dairy cattle only | 28 | 29.2 |
| Sheep & goats only | 59 | 61.5 |
| Dairy & sheep/goats | 3 | 3.1 |
| No livestock | 6 | 6.2 |

**Labour.** The main source of manual labour was the rural family, (farmer and wife). About 92% of total available labour was used on the farm and the remainder was used off-farm (Table 1). The low off-farm employment was attributed to the fact that the majority (about 94%) of hay-producers were at the same time livestock keepers. Livestock keeping is not only labour demanding, but it also requires the presence of someone on the farm.

**Capital.** The mean farm size was about 20 dairy cattle or 74 sheep and goats. About 30% the of farms had dairy cattle only and about 62% had sheep and goats only. Three percent of the farms had dairy cattle, sheep and goats and 6% had no livestock at all (Table 2). Apart from the livestock capital, hay producers owned a variety of machinery. Out of the 96 farmers surveyed, 63 had a tractor, 45 a trailer, 28 a mower, 29 a rake, and 19 a baler (Table 3). Some hay-producers relied on hired and mainly on contract machinery to produce hay. Another form of capital were animal sheds, feed stores and sheds for hay storage. About 74%

**Table 3.** Machinery used for hay production

| Item | Kokkino-choria | Larnaca coastal | Limassol coastal | Nicosia mixed | Larnaca mixed | Total |
|---|---|---|---|---|---|---|
| Number of farms | 14 | 14 | 10 | 27 | 31 | 96 |
| Number of tractors | 9 | 7 | 3 | 24 | 20 | 63 |
| Mean value (£) | 1734 | 3660 | 5500 | 4785 | 4174 | 4174 |
| Mower machines (No) | 1 | 2 | 2 | 15 | 8 | 28 |
| Mean value (£) | 200 | 725 | 1910 | 1273 | 975 | 1155 |
| Rakes (No) | 1 | 2 | 1 | 17 | 8 | 29 |
| Mean value (£) | 100 | 150 | 200 | 700 | 351 | 531 |
| Balers (No) | - | 2 | 1 | 10 | 6 | 19 |
| Mean value (£) | - | 2500 | 3700 | 3660 | 2057 | 3047 |
| Trailers (No) | 5 | 6 | 2 | 16 | 16 | 45 |
| Mean value (£) | 166 | 475 | 200 | 781 | 299 | 475 |

of hay-producers had hay storage sheds of varying capacity (from 500 to over 5000 bales). About one third of them have had financial assistance through various projects of the Department of Agriculture. Hay produced was stored under hay sheds or in other buildings (68%), 8% was covered with polyethelene and 24% was left unprotected (Appendix Table 6).

**Labour requirements**. The total labour requirements for the various types of hay ranged between 13 and 16 h/ha. The most labour-requiring operations were loading, transportation and stacking. Apart from labour, an amount of £25 to £54/ha was needed for contract work. The operations requiring contract work were cultivation, baling and cutting/raking (Table 4). The mean wage rate for the male worker was £12/day (range £10 to £20) and for the female worker £9/day (range £7 to £10).

**Cost of production**. The costs of production for cereal, legume and cereal-legume hay mixtures are given in Table 5. Variable costs amounted to £122/ha for cereal hay, £130 for legume and £117 for cereal-legume mixtures. They included seed, fertilizers, machinery expenses, other costs and interest on operating capital. Fixed costs amounted to £102/ha for cereal, £92 for legume and £113 for mixed hay. They included rent of land (paid or imputed), family labour (imputed), interest and depreciation of sheds and machinery. In the majority of farms surveyed, hay was used to feed the on-farm livestock and it was not possible to establish market

**Table 4.** Labour requirements[a] (hrs/ha) and contract work (£/ha) for rainfed hay production by type and operation, 1988/89

| | Cereals | | Legumes | | Mixtures | |
|---|---|---|---|---|---|---|
| Item | Labour (h) | Contract work(£) | Labour (h) | Contract work(£) | Labour (h) | Contract work(£) |
| Observations | 72 | | 58 | | 10 | |
| Cultivating | 1.8(54)[b] | 2.2(20) | 1.8(35) | 5.5(26) | 1.8(10) | 1.0(2) |
| Seeding & Fertilizing | 2.0(49) | 2.8(23) | 1.5(30) | 6.0(28) | 1.8(8) | 3.8(2) |
| Harvesting/ Cutting/raking | 1.7(29) | 12.0(44) | 0.4(9) | 22.2(49) | 1.0(6) | 4.5(5) |
| Baling | 0.7(18) | 17.6(54) | 0.1(6) | 17.0(52) | 0.3(2) | 12.7(8) |
| Loading/ transportation | 5.8(52) | 1.2(8) | 5.0(58) | 3.2(16) | 5.2(10) | 3.0(3) |
| Piling up | 4.1(52) | - | 3.8(58) | - | 4.0(10) | - |
| TOTAL | 15.9 | 35.6 | 12.6 | 53.9 | 14.1 | 25.0 |

a) Mean daily wage rate for males was £12 and for females £9.
b) Numbers in brackets denote the number of growers applying this operation.

prices and hence, check its profitability. The average total cost was £38.6/t for cereal, £55.7/t for legume and £47.9/t for mixture hay. Taking into consideration the subsidy of £17/t, which represents 52 to 80% of the variable cost/t, livestock keepers bear only 20 to 48% of the cash expenses for hay production. Depending on the productivity of land, there is a substantial fluctuation of average costs. The average total cost of cereal hay ranged between £29 and £74/t and that of legume hay between £33 and £120/t.

**Table 5.** Production costs of rainfed hay per ha, 1988/89

| Item | Cereals | Legumes | Mixtures |
|---|---|---|---|
| Observations | 72 | 58 | 10 |
| Area cropped (ha) | 115.7 | 90.6 | 24.1 |
| Yield (t/ha) | 5.8 | 4.0 | 4.8 |
| Variable costs | | | |
| Seed | 33.7 | 35.6 | 34.3 |
| Fertilizers | 32.6 | 26.1 | 32.4 |
| Own machinery expenses (fuel, oil, repairs) | 14.7 | 8.9 | 20.0 |
| Machinery on contract | 35.6 | 53.9 | 25.0 |
| Other costs | 2.9 | 3.1 | 2.8 |
| Interest on operating capital | 2.7 | 2.9 | 2.6 |
| A. TOTAL VARIABLE COSTS £ | 122.2 | 130.5 | 117.1 |
| Fixed costs | | | |
| Rent of land | 59.7 | 59.7 | 59.7 |
| Family labour | 23.7 | 20.7 | 27.6 |
| Interest & depreciation | 16.0 | 9.7 | 23.0 |
| General costs | 2.5 | 2.3 | 2.8 |
| B. TOTAL FIXED COSTS £ | 101.9 | 92.4 | 113.1 |
| C. TOTAL COSTS (B+C) £ | 224.1 | 222.9 | 230.2 |
| AVERAGE VARIABLE COST £ | 21.1 | 32.6 | 24.4 |
| AVERAGE TOTAL COST £ | 38.6 | 55.7 | 47.9 |
| Subsidy received as % of | | | |
| AVERAGE VARIABLE COST | 80.6 | 52.1 | 69.7 |
| AVERAGE TOTAL COST | 44.0 | 30.5 | 35.5 |

## Relationship between yield of hay and average costs

Using yield as the independent variable and variable cost/t (AVC) or total cost/t (ATC) as the dependent variable, regression lines were fitted for each type of hay (Figure 1). Average variable and total costs for all hay types decreased at a progressively lower rate with increasing yields due to the diminishing returns of inputs. The rate of decrease differred among types of hay. The reliability of the fitted curves was high for cereals and legumes, but lower for mixtures, mainly due to the small number of observations. Both average variable and total cost/t of all types of hay increased with time. This is consistent with the increasing cost of production through time for all agricultural products.

An estimation of cereal hay profitability based on the market value of imported and locally produced barley and imported soya, which can be substituted at the rate of 1 t of hay to 0.497 t of barley plus 0.09 t of soya, and the national average cost of production for the period 1978-89, showed that until 1984 the value of cereal hay at both imported and locally produced prices of grain was higher than the cost of production minus subsidy, which means that it paid the livestock keepers to produce and utilize hay rather than grain. After 1984, however, the cost of hay production exceeded the market value of the equivalent imported grains and without increasing the subsidy it would have been unprofitable to many livestock keepers to produce and utilize hay. By increasing the subsidy from £8 to £17/t, hay production was more attractive than grain production, at

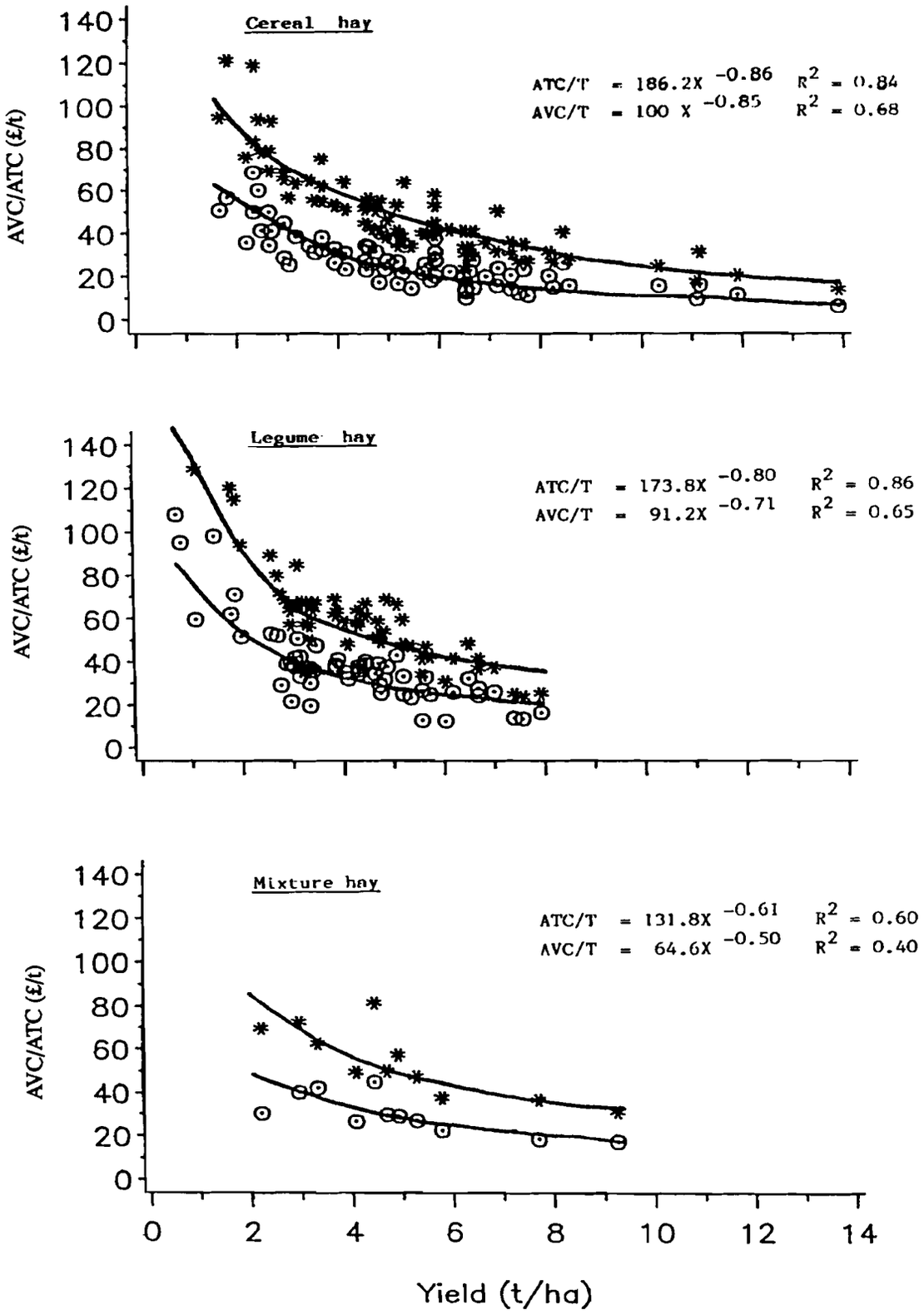


**Figure 1.** Relationship between yields/ha (x) and average variable (AVC/T) and total cost/t (ATC/T) of various types of hay, 1988/89.

least to the livestock keepers, and reversed the diminishing trend of hay production. A large scale switch to hay production, however, would be expected to occur if the present system of grain subsidy is abandoned or significantly altered.

An opinion poll among the participating farmers showed that the majority (92%) used their hay as input for their livestock enterprises and only 8% sold it to others. Marketed hay was mainly vicos and barley hay. Hay production took place either at the 50% heading stage (49%) or at the milk stage (32%) and rarely at the boot stage (19%). Legume hay was cut at the flowering stage (70%) or at arly pod formation (30%).

Almost all producers surveyed (98%) were aware of the recent increase in hay subsidy and 77% of them stated that they have increased production. Hay production, mainly from cereals, increased at the expense of grain production, as expected. In the majority of cases (81%), hay is sown on good land and almost always after a cereal crop. The majority of hay producers surveyed (89%) stated that they would use irrigation if the price of water ranged from 1 to 5 cents/t (40%) or 6 to 10 cents/t (59%).

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**Appendix Table 1.** Quantity of hay produced and subsidized, 1978-1989

| Year | Growers (No) | Area (ha) | Area (ha/grower) | Quantity of hay inspected (t) | Mean quantity of hay inspected (t/grower) | Mean yield (t/ha) | Quantity of hay subsidized (t) | Maximum quantity subsidized (t/grower) |
|---|---|---|---|---|---|---|---|---|
| 1978 | 1227 | 4295 | 3.5 | 11382 | 9.3 | 2.65 | 11382 | 50 |
| 1979 | 1579 | 4620 | 2.9 | 11457 | 7.3 | 2.48 | 10497 | 15 |
| 1980 | 2118 | 7124 | 3.4 | 22450 | 10.6 | 3.15 | 14906 | 10 |
| 1981 | 2312 | 6943 | 3.0 | 19973 | 8.6 | 2.88 | 18245 | 14 |
| 1982 | 3801 | 9501 | 2.5 | 31743 | 8.4 | 3.34 | 14568 | 4 |
| 1983 | 3642 | 11536 | 3.2 | 26560 | 7.3 | 2.30 | 26560 | 100 |
| 1984 | 4453 | 1414 | 13.2 | 34235 | 7.7 | 2.42 | 26606 | 79 |
| 1985 | 4427 | 15027 | 3.4 | 38037 | 8.6 | 2.53 | 28258 | 74 |
| 1986 | 2578 | 10824 | 4.2 | 14593 | 5.7 | 1.35 | 14593 | 100 |
| 1987 | 2518 | 11507 | 4.6 | 20016 | 7.9 | 1.73 | 20016 | 100 |
| 1988 | 2183 | 10497 | 4.8 | 23374 | 10.7 | 2.23 | 21001 | 90 |
| 1989 | 2384 | 9858 | 4.2 | 21209 | 8.9 | 2.15 | 21209 | 100 |

As % of total quantity after 1983.
Source:Department of Agriculture (1981-89).

**Appendix Table 2.** Area, production and productivity of various types of hay inspected by the Department of Agriculture, 1978-89

| | Cereals hay | | | Legumes hay | | | Mixtures hay | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Area (ha) | Yield (kg/ha) | Production (t) | Area (ha) | Yield (kg/ha) | Production (t) | Area (ha) | Yield (kg/ha) | Production (t) |
| 1978 | 775 | 4004 | 3104 | 1460 | 3264 | 4764 | 970 | 3623 | 3515 |
| 1979 | 1028 | 3055 | 3140 | 1987 | 2540 | 5045 | 1155 | 2868 | 3312 |
| 1980 | 1412 | 3967 | 5602 | 3142 | 3488 | 10958 | 1706 | 3481 | 5940 |
| 1981 | 1669 | 3675 | 6132 | 2628 | 3332 | 8756 | 1461 | 3481 | 5085 |
| 1982 | 1667 | 3914 | 6564 | 4903 | 3369 | 16517 | 2362 | 3668 | 8662 |
| 1983 | 2703 | 3025 | 8177 | 4158 | 2652 | 11027 | 2580 | 2846 | 7344 |
| 1984 | 4008 | 2943 | 11795 | 5157 | 2562 | 13213 | 3300 | 2786 | 9195 |
| 1985 | 3688 | 3511 | 12950 | 5632 | 2794 | 15737 | 2984 | 3115 | 9295 |
| 1986 | 2965 | 2190 | 6494 | 2691 | 1510 | 4063 | 1902 | 2120 | 4033 |
| 1987 | 2703 | 2870 | 7758 | 3346 | 2250 | 7528 | 1701 | 2780 | 4730 |
| 1988 | 2927 | 3850 | 11270 | 2418 | 2540 | 6141 | 1824 | 3270 | 5963 |
| 1989 | 3118 | 3200 | 9977 | 2843 | 2280 | 6481 | 1741 | 2730 | 4752 |

Source:Department of Agriculture (1981-89).

**Appendix Table 3.** Proportion (%) of hay produced by owners of cattle, sheep and goats and non-holders of animals

| Year | Owners of cattle | Owners of sheep and goats | Non-holders |
|---|---|---|---|
| 1978 | 41.2 | 50.1 | 8.7 |
| 1979 | 44.6 | 51.7 | 3.7 |
| 1980 | 42.0 | 52.7 | 5.3 |
| 1981 | 43.5 | 47.4 | 9.1 |
| 1982 | 35.9 | 59.3 | 4.8 |
| 1983 | 40.2 | 55.0 | 4.8 |
| 1984 | 40.6 | 54.6 | 4.8 |
| 1985 | 36.7 | 58.5 | 4.8 |
| 1986 | 32.2 | 62.6 | 5.2 |
| 1987 | 30.8 | 65.3 | 3.9 |
| 1988 | 37.1 | 60.7 | 2.2 |
| 1989 | 37.8 | 58.4 | 3.8 |

Source:Department of Agriculture (1981-89).

**Appendix Table 4.** Production of hay and distribution of growers according to total production by main zone, as compared to all zones, 1988

| Item | Zones | | | | | Total | Total Cyprus | % |
|---|---|---|---|---|---|---|---|---|
| | Nicosia mixed | Larnaca mixed | Larnaca Coastal | Limassol Coastal | Kokkino-khoria | | | |
| No of villages | 37 | 23 | 16 | 18 | 9 | 103 | 399 | |
| No of villages producing hay | 31 | 23 | 15 | 14 | 9 | 92 | 206 | |
| No of growers | 396 | 527 | 237 | 160 | 262 | 1582 | 2181 | 100.0 |
| % of total | 18.1 | 24.2 | 10.9 | 7.3 | 12.0 | 72.5 | 100.0 | |
| Production strata (t/grower) | | | | | | | | |
| - 5 | 102 | 156 | 98 | 68 | 147 | 571 | 901 | 41.3 |
| 5-10 | 114 | 178 | 83 | 42 | 76 | 493 | 647 | 29.7 |
| 10-20 | 87 | 124 | 44 | 33 | 31 | 319 | 404 | 18.5 |
| 20+ | 93 | 69 | 12 | 17 | 8 | 199 | 229 | 10.5 |
| Total production (t) | 6275 | 5573 | 1789 | 1447 | 1647 | 16731 | 20956 | 100.0 |
| % of total | 29.9 | 26.6 | 8.5 | 6.9 | 7.9 | 79.8 | 100.0 | |
| Mean production (t/grower) | 15.8 | 10.6 | 7.6 | 9.1 | 6.3 | 10.6 | 9.6 | |

**Appendix Table 5.** Sample size

| Item | Nicosia mixed | Larnaca mixed | Larnaca Coastal | Limassol Coastal | Kokkino-choria | All |
|---|---|---|---|---|---|---|
| No. of growers | 27 | 31 | 14 | 10 | 14 | 96 |
| Sample fraction (%) | 6.8 | 5.9 | 5.9 | 6.2 | 5.3 | 6.1 |
| No. of observations | | | | | | |
| Cereals | 26 | 25 | 9 | 1 | 11 | 72 |
| Legumes | 7 | 17 | 10 | 13 | 11 | 58 |
| Mixtures | 6 | 1 | 2 | 1 | - | 10 |
| Sample production (t) | 450 | 360 | 135 | 73 | 130 | 1148 |
| % of total | 7.2 | 6.5 | 7.5 | 5.0 | 7.9 | 6.9 |

**Appendix Table 6.** Hay stored by various methods (% of total)

| Year | Storage in hay sheds and other stores | Covered with polyethelene in yard | Unprotected in yard |
|---|---|---|---|
| 1978 | 49.4 | 15.1 | 35.5 |
| 1979 | 54.4 | 26.8 | 18.8 |
| 1980 | 54.8 | 10.3 | 34.9 |
| 1981 | 61.7 | 6.4 | 31.9 |
| 1982 | 57.8 | 9.0 | 33.2 |
| 1983 | 57.4 | 9.3 | 33.3 |
| 1984 | 56.7 | 9.8 | 33.5 |
| 1985 | 62.6 | 15.3 | 22.1 |
| 1986 | 64.1 | 10.7 | 25.2 |
| 1987 | 63.7 | 5.5 | 30.8 |
| 1988 | 67.0 | 6.1 | 26.9 |
| 1989 | 68.3 | 7.9 | 23.8 |

Source: Department of Agriculture (1981-89)

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