

Prospects for grassland utilization in Eastern Europe

G. van Dijk and N. Hoogervorst

Department of Agricultural Economics and Policy, Agricultural University of Wageningen, Netherlands

Accepted: 15 June 1984

Key-words: grassland utilization, Eastern Europe, economic role

Introduction

Studies of grassland usually concentrate on the biological and technical aspects of grass growth and on its cultivation. Such research contributes to food supply via ruminant production. Normally grass is an intermediate product that is produced and consumed by the same economic unit. Thus there is no overt valuation. This absence of a direct or open pricing system for grass poses considerable difficulties in studying grassland production from an economic point of view. To assess its economic importance, grassland has to be analysed in the wider context of the production system of which it is a part. To gain more insight in the economic role of grassland in Eastern European countries, this paper examines the relationships between grassland production and other production factors.

Fig. 1 shows factors that all influence the allocation of resources to grassland production, which is one of the many processes of agricultural production. The figure illustrates that the development of grassland production is subject to factors influencing agriculture as a whole and to factors changing the input allocation between grassland and alternative processes of agricultural production.

If one looks at the possible developments of each of these factors (as far as they are related to grassland production), various questions emerge about the future role of grassland in Eastern Europe. Among these are: Which are the present and future constraints to grassland production? Can these be overcome by more research and, if so, what kind of research? What is the present role of grassland in meeting certain economic policy targets (such as adequate food supply) and how can grassland production more optimally contribute to reaching such targets in the future? By examining the relation between grassland production and its economic environment, in this paper some aspect of these kinds of questions are analysed.

Grassland production is analysed by comparing its economic characteristics in Eastern European (or CPE) countries (as a group) with those of Western European countries. It will be shown that the observed differences in economic roles and importance of grassland can be attributed to more factors than ecological conditions.

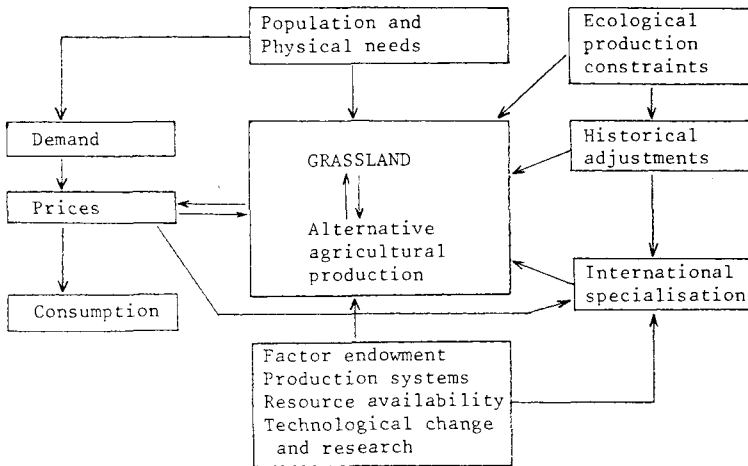


Fig. 1. Schematic representation of factors influencing grassland production.

Among these are structure and policy of agricultural production, consumer demand, economic and social organisation of a country and international trade relationships. Comparing country-groups may obscure the variations in grassland production that exist among individual countries or areas within these two European regions. The advantage of such a comparison is that special attention can be paid to the effects of the different economic systems and their significance for grassland utilization in Europe.

Grassland input in food production

The value of grassland is essentially determined by its contribution to food supply. Biological habitat, landscape improvement or conservation are generally not taken into account when decisions are made about grassland production and management. Rather, the local and foreign demand for foodstuffs (for which grassland can be an input) and aspects of farm management determine the extent to which the potentials for grassland production are used. Thus it is assumed that the development of consumer's demand for grassland products (i.e. milk, beef and veal, mutton and lamb and goat meat) is an important determinant for grassland production. By examining the role of grassland products in the domestic food supply in various countries, the relative importance of consumer's demand for future grassland developments (locally and abroad) can be illustrated.

The data in Table 1 show that grassland products are more prominent in diets in EC countries than in CPE countries. In the latter, cereal consumption is relatively high and beef consumption is fairly low. Other kinds of meat (or meat products) seem to compensate for this. The total meat consumption per capita in most Eas-

Table 1. Per capita annual energy intake from various food categories in kJ in 1978.

Food category	Bulgaria	CSSR	GDR	Hungary	Poland	Rumania	EC-9
All meat & meat products	588	796	825	667	675	525	775
Beef	104	221	187	121	175	96	475
Sheep and goat	54	8	8	4	4	21	25
Milk and milk products	450	488	838	325	283	442	776
Cereals	2184	1474	1292	1634	1663	2189	1130
Milk (products)/cereals (%)	21	33	65	20	17	20	69
Beef/cereals	5	15	15	7	11	4	42

Sources: Nederlands Voorlichtingsbureau voor de Voeding (Algemene voedingsmiddelen-tabel)/Netherlands Information Office for Food: Netherlands Table of Food Products; OECD 1981-1982; CEC 1980.

tern European countries, however, is still below their target quantities; for cereals it is still higher (OECD, 1981-1982). Consumption levels of dairy products (excluding butter) are generally lower in Eastern European countries. In general it can be concluded that Eastern European diets are basically cereal-based, while Western European diets contain a larger share of grassland products. Since virtually all countries are now self-sufficient in these products (EAAP), it can also be concluded that grassland production plays a more important role in the domestic food supply in Western European countries.

In addition to domestic demands for grassland products, countries may also be faced with foreign sources of demand. In centrally planned economies exports may also be the result of political efforts aimed at pursuing a favourable balance of payment position with western countries. Self-sufficiency ratios (SSRs) for milk show that Mediterranean countries and the UK are importers of milk and dairy products. These imports range from 10 to 27 % of domestic utilization. European CPE countries have self-sufficiency ratios ranging from 99 to 109¹; in all other European countries milk production exceeds domestic human consumption by far (EAAP). For beef and veal the differences in Europe are much bigger. Some countries are large exporters (Ireland's SSR was 613 % in 1978), while others have to import large quantities (Greece 52 %, Italy 39 % of domestic consumption) (EAAP). The Eastern European countries as a group are self-sufficient, with USSR, CSSR and GDR as net importing countries and Hungary as an important net exporter. Bulgaria and Rumania are important exporters of mutton (OECD, 1981-1982). Thus in various European countries, and most notably in Denmark, Ireland, Netherlands, Hungary, Poland and Romania, grassland production has important implications for the national economy via its contribution to foreign trade.

In this paper we focus on the contribution of grassland to the production of grass-

¹ Especially in centrally planned economies an SSR of 100 does not necessarily imply that all domestic demands are met. It rather means that the entire domestic production is consumed domestically, i.e. an increase in production may very well lead to a corresponding increase in domestic consumption.

land products. The demand for grassland essentially is regarded as a derived demand, the demand for dairy products and ruminant meats is primary demand. Grassland products can potentially be based on grass only, but in practice there is a wide variety of diets for ruminants. Therefore the techniques and economies of production determine whether, how and to what extent grassland is used to produce grassland products.

Production and utilization of grassland

To compare grassland utilization one has to start by examining various characteristics of grassland production. The best measurable characteristic is the area of agricultural land that is devoted to grassland production. Table 2 compares the relative importance of grassland in various countries. These data clearly show that grassland production is more dominant in Western than in Eastern European countries. In general these shares have hardly changed during the past 30 years, except for Bulgaria. In that country, statistics show that the share of grassland has doubled since 1960. Also in Hungary a slight increase has occurred. In Denmark the area under grassland is declining.

Next to the comparison of land use in grassland production, the relative importance of non-land inputs should be taken into account. These inputs may vary from water and fertilizer to management and technology (sward composition, harvesting techniques, etc.). We found it very difficult to assess average national differences in the application levels of these inputs, as the data should be derived from experiments. Most research reports on this subject deal with specific, and local situations. Nevertheless we composed an index of grassland output per hectare in various European countries, to gain some idea of the national differences in input levels (and efficiency) in grassland production (see Table 3). From Table 3 it is again clear that large differences exist between Western and Eastern European countries. These differences may be attributed mainly to ecological conditions such as temperature, precipitation and soil conditions, but differences in input levels also play an important role. Although there is only scant information and a lack of comparative data it may be concluded that more nitrogen is applied to grassland in Western European

Table 2. Share of grassland in utilized agricultural area (UAA) in EC-9 countries and Eastern European countries (%).

<i>EC-9</i>		<i>Eastern Europe</i>	
Belgium/Luxemburg	50	Bulgaria	30
Denmark	21	Czechoslovakia	25
France	49	GDR	22
FRG	40	Hungary	20
Ireland	90	Poland	33
Italy	30	Rumania	30
Netherlands	59	Yugoslavia	44
UK	73	USSR	58

Source: Lee (1983).

PROSPECTS FOR GRASSLAND UTILIZATION IN EASTERN EUROPE

Table 3. Index of average actual grassland yields (kg DM/ha/per annum) in European countries between 1975 and 1980 (Netherlands = 100).

<i>EC-9</i>		<i>Eastern Europe</i>	
Belgium/Luxemburg	70	Bulgaria	20
Denmark	75	Czechoslovakia	35
France	70	GDR	45
FRG	60	Hungary	25
Ireland	55	Poland	35
Italy	20	Rumania	30
Netherlands	100	Yugoslavia	25
UK	45	USSR	20

Source: own estimates based on data presented by Lee (1983) and on data for annual and perennial (seeded) grass hay (taken at 80 % DM content) for Eastern Europe, presented in CMEA (1979).

Table 4. Estimated share of grass in total ruminant feed consumption in EC-9 countries (% feed units in 1978/1979) and in Eastern European countries (% grain units).

<i>EC-9</i>		<i>Eastern Europe</i>	
Belgium/Luxemburg	51	Bulgaria	34
Denmark	47	Czechoslovakia	59
France	71	GDR	50
FRG	60	Hungary	45
Ireland	97	Poland	51
Italy	53	Rumania	53
Netherlands	54	Yugoslavia	66
UK	83	USSR	59

Source: own estimation (see Appendix A).

countries. In Eastern Europe large areas of grassland consist of natural meadows and pastures, with hardly any fertilizer application at all. Also the input of management skills, technology and technical know-how is probably considerably higher in Western European grassland production systems.

As in grassland production, regional differences also exist in grassland consumption, i.e. the importance of grass as a ruminant feed input. In Table 4 estimates are presented of the share of grass in total ruminant feed consumption.² As with production data, the variation among Eastern European countries is substantially smaller than among EC-9 countries. Again, such differences are to a considerable extent due to ecological conditions, but also differences in animal production systems and in economic circumstances play an important role.

When the data from Table 4 and Table 2 (share of grassland in UAA) are compared, a general correlation between the two variables appears: a higher share of grass in ruminant diets coincides with a higher share of grassland in the utilized agricultural area. There are a few exceptions, namely the Netherlands, Belgium/Luxemburg and the USSR; in these countries the share of grassland in land use is high-

² The estimation procedure is presented in Appendix A.

er. In the USSR this is partly explained by the low yield of grassland (see Table 3) which needs to be compensated by a large grassland area. However, in the Benelux countries, grassland output per hectare is highest in Europe. The low share of grass in feed consumption in these countries can rather be explained by high yields of milk per cow and commensurate high levels of (imported) concentrate feeds.

Ecological conditions for grassland production

Lee (1978) has constructed a land capability map for forage production in which ecological factors like temperature, precipitation and soil conditions have been taken into account. This map also, be it in general terms, reflects regional differences in favourable ecological conditions for grassland production.

In general, land located north of the 60th parallel (Scandinavia, Northern USSR) and south of the 44th parallel (Mediterranean countries) are ill-suited for grassland production. The most favourable conditions seem to be present in the North Sea area (Ireland, UK, Netherlands, north-west parts of France) and in southern Bavaria (FRG), where pasture yields are 10 000–15 000 kg DM/ha (Lee, 1978). In predominantly hill-land areas, mainly in the Central European highlands, Alpine foreland and Massif Central, grassland production is restricted by soil conditions such as depth, stoniness and slope. In the remaining part of Europe lack of moisture restricts grassland production to various degrees, occasionally aggravated by high temperatures (Polish plains and Southern Taiga/Forest zone in the USSR) (van Dijk et al., 1982).

From an economic point of view it is important to have an indication of the extent to which different countries have made use of these ecological conditions in terms of grassland production. Ecological conditions for grassland production are reflected by grassland yields under natural conditions, i.e. without fertilization and irrigation. Estimates of these natural yields are thought to indicate an area's suitability for grassland production (which does not mean that the area is less suited for any other kind of production).

If ecological conditions are the main determinant of grassland (resources) allocation, then differences in suitability would be reflected in differences in actual grassland utilization (which is a combination of area and productivity of grassland). This is illustrated in Table 5. First, in Table 5 the countries have been grouped in five categories of suitability for forage production, on the basis of the land capability map referred to above (Lee, 1978). Second, within each category countries have been classified according to the actual average DM grassland yields and subsequently to the share of grassland area in total utilized agricultural area (UAA).

It may be hypothesized that countries with poor natural conditions for grassland production have relatively little land devoted to grassland and show relatively low grassland yields. If this is the case, all countries would be along the diagonal in the diagram. The data do not support this hypothesis. Instead, Table 5 shows a more diverse distribution of countries across the diagram. This suggests that countries like Hungary and CSSR with average actual yields, low and medium, respectively, but with a more than average suitability, do not take full advantage of their natural

PROSPECTS FOR GRASSLAND UTILIZATION IN EASTERN EUROPE

Table 5. Ecological suitability for grassland production versus actual utilization of potentials, for various European countries between 1975 and 1980.

Suitability ¹	→	0-15	15-30	30-45	45-65	65-100
actual yields ²	land use ³ (90)					
low 0-30	0-30 30-60 60-100	Finland Spain Greece Iceland	Italy Yugoslavia	Bulgaria USSR	Hungary	
medium 30-60	0-30 30-60 60-100		Rumania UK	GDR Poland		CSSR Ireland
high 60-100	0-30 30-60 60-100			Belgium Luxemburg	Denmark France FRG	Netherlands

Sources: ¹ Own estimates of grassland output without fertilization or irrigation, inferred from the land-capability-map in Lee (1978) and from van Dijk et al. (1982), and van Burg et al. (1981). Index numbers; Netherlands = 100.

² Index numbers from Table 3.

³ Grassland share in utilized agricultural area; from Table 2.

conditions with respect to grassland. On the other hand countries like the UK and Belgium have combined technical skills with natural circumstances leading to production levels above those to be expected from their environmental conditions. This leads to the following interpretation of Table 5: countries in the upper right corner of the diagram have made only little use of the favourable natural circumstances for the production of grassland³, whereas countries in the lower left corner have tried to take full advantage of them.

More deviations from the hypothesized rule occur. The high potential and actual grassland yields in Denmark for instance did not lead to a high share of grassland in total UAA. As conditions there are also suitable for arable production, this production has increased to the detriment of the share of grassland. Despite low potentials and yields in Iceland, on the other hand, 99 % of its UAA is devoted to grassland. In Iceland the conditions (temperature, day length etc.) prevent other crops from having any appreciable share in land use. In Eastern European countries natural inputs and agricultural land are apparently used for arable production rather than for grassland, where both alternatives are physically possible. Clearly, grassland is not uniquely related to natural conditions alone. Where farmers have a choice between

³ Is it surprising to see that this division in the upper-right and lower-left part of the diagram tends to coincide with a division between Eastern and Western European countries?

grassland or arable production, economic conditions are usually such that the latter is favoured.

Thus ecological advantages or constraints are not the main or only determinants for systems of agricultural or grassland production. Rather we should also look for economic⁴, social, political or historical factors to explain why in some countries natural inputs are used in production systems other than grassland production when their productive capacities are comparable.

Grassland in the structure of agricultural production

In present production systems most of the feed for ruminant production in Eastern European countries is supplied from arable farming. Plans to increase ruminant production are therefore mostly linked to increasing the input of feed grains. As the preference for arable production over grassland production as a source of feed supply cannot be derived from climate, soil fertility and other ecological differences only, we will now discuss some structural conditions for grassland production.

Production structure at farm level

Grassland production requires a more flexible management system than arable production. One has to reconcile a known and relatively inflexible demand for feed by the livestock herd with a fluctuating production of grass. Where water and nitrogen is not limiting, the seasonal variation in production is predictable, but if rainfall in a certain period is abnormally low, the use of fertilizer increases the degree of seasonality. Also variation in spring temperature strongly influences variation in grassland production. As a result the high production potentials of grassland can only be fully exploited when grass utilization is matched with appropriate stocking rates, adequate forage conservation and alternative reserve feeds. All this requires, in turn, sufficient flexibility in investment and availability of capital, a well-developed trade structure for animal feeds and adaptability in feeding ration. The need for management skill to adequately buffer herbage production can be illustrated from practices on individual farms. On larger farms in the Netherlands, with higher rates of stockings and of nitrogen application, farmers apply less risky harvest methods (i.e. silage instead of hay) and have a wider margin of substituting feed stuffs. Farms with smaller herds more often employ hay making and usually have to rely on flexibility in grassland management.

Kilkenny & Dench (1981) reported on the role of grassland in beef production in various production systems. They concluded that a greater emphasis on grass feedings means that beef cattle are older when slaughtered than those on arable feeding. Thus the total fodder requirement of each animal is higher. Moreover, these authors pointed to the interaction of using grass in beef production systems and the choice of breeds. Early-maturing crosses are particularly suited to a system of grass finishing. The reason why early maturity fits best in this system is explained entirely

⁴ Here, economical refers to: income levels and distribution, size and composition of population, food requirements, price levels, etc.

by the shorter grazing period. Early in the season, high rates of grass growth easily support the increasing weight of the cattle. Then from mid-season, as grass availability declines, slaughter reduces the number of cattle so that the remainder still have sufficient grazing. Cattle performance matches the seasonality of grass production. The variation in grass production, in herd composition and in differences in breeds can be matched by varying the levels of concentrates. This situation again illustrates the need for flexibility in feed supply. In more intensive production systems, grassland is to a large extent supplemented by other feedstuffs. The same phenomenon can be observed in sheep production on grass (Thomas & Kilkenny, 1981).

Wädekin (1982) supposed that in Eastern European countries most state farms have been more generously supplied with fertilizer. Thus the potential of yield increases through more fertilizer application seems to be greater in the collective and private farms than in state farms. Private farms are usually smaller in size so that the statement may be especially valid with respect to grass production.

From the data and available literature it may be hypothesized that land and labour input in animal production has declined modestly in recent decades. On the other hand the input of capital has greatly increased during this period. Increases in productivity are therefore probably caused more by higher capital intensities than by improvements in farm organisation and land use. Therefore grassland production would require smaller units and more flexibility in production than can be achieved by the present structural developments. These structural changes are the result of policies which pursue the standardization of large scale production in agro-industrial units. Apparently the advantages of production in smaller units, a prerequisite to achieve fuller exploitation of the potentials of grass production, are thought not to outweigh the disadvantages foreseen by leaving the present policy of agricultural development by agro-industrial complex formation. In CPE countries the structural developments are almost unidimensional in this respect.

Production structure at state level

The performance of arable farming as the major supplier of animal feeds in Eastern Europe has hardly been adequate up to now. Animal production output is dependent on production levels of fodder grain. In those countries where animal production has increased, this growth was mainly due to the contribution of the private sector (Rumania, Hungary). Livestock herds have grown only very slowly in Eastern Europe and they even declined in CSSR, Yugoslavia and Albania. A more rapid growth set in during the early 1970s although there was a setback after the 1976 drought. This relative failure was primarily due to variations in crop yields and the resulting unreliable supplies of feed, but also to the marked decline in private livestock holdings (Wädekin, 1982). Despite these problems, milk yields per cow in Eastern Europe have increased over the past 25 years under influence of increased input of high-quality compound feeds. Also the higher productivity of fodder crops has contributed significantly in recent years. Because unexploited potentials for grass production exist (see the previous section), a greater emphasis on grass and high-quality silage production would seem worthwhile, even when this implies

modernization through reform of the present structure of agricultural production.

In the 1960s and 1970s Eastern European governments chose to generate capital in the public sector to supply the inputs for agro-industrialization. This introduction of capital input may have obscured the lack of improvement in land use and insufficient fine-tuning in forage production with ruminant output. In Hungary, present policies are emphasizing further improvement of production systems, rather than increases in farm size. Indeed, except in Bulgaria where policies are still favouring extensive state agro-industrial complexes, governments in most countries seem to recognize that they have already reached the limits. Thus conversion ratios and the composition of rations now receive more attention.

By improving the composition of rations by adding protein, overfeeding may be reduced. In Eastern European countries overfeeding is a common problem arising from the lack of protein. It has been estimated that in Poland 15-30 % (1.5-2 million tons) of the total grain given to livestock in 1965/1967 was overfeeding (Wädekin, 1982). Since then overfeeding is said to have increased. In Rumania present programmes are designed to improve pastures and so lower conversion ratios.

As most European countries are dependent on imports of animal feeds, grass production might play a role as a substitute for these imports. Only Hungary and Rumania are able to export feed such as maize and feed barley. In the GDR and the CSSR the acreages of these feed grains have been extended in recent years. Other countries especially strive for higher yields.

Also rapeseed and sunflower are being produced to substitute for imports of maize gluten and soya. After a period of putting the main emphasis on increasing quantities of feed grain, Eastern European countries (since 1978) are beginning to acknowledge that improving pasture production, rather than relying exclusively on grain and synthetic protein additives (ureum, single cell protein, microbial proteins), can contribute to solving their protein problem.

Grassland in relation to general agricultural policy in Eastern Europe

From a political or national point of view the main goal of agricultural production continues to be the expansion of agricultural output with animal production having as large a share as possible. This development is stimulated by price and investment policies and by policies aimed at structural improvement of the agricultural sector. Among the latter, agricultural research is of key importance. The economic milieu in which grassland production will develop depends on the future size of population, its consumption pattern and government policy. In Eastern Europe the structure of production is strongly related to technological and economic changes which are, in turn, governed by public policy. This is an important distinction, since grassland as a resource may not be compatible with too rigid political ideals on the structure of (ruminant) production. The degree of flexibility or decentralization will therefore influence the way in which grassland inputs develop in ruminant production.

A major factor in the application of public policy to ruminant production is the way in which feed grains are regarded. A policy of low prices for feed grain deval-

PROSPECTS FOR GRASSLAND UTILIZATION IN EASTERN EUROPE

Table 6. Share of state and cooperative farms in animal production in Eastern European countries in 1978 (%).

	Beef	Milk	Mutton & lamb	Veal	Pork	Poultry
Bulgaria	76	76	57	73	61	60
CSSR	96	93	76	52	82	92
GDR	96	98	95	85	96	94
Hungary	74	65	78	78	n.a.	n.a.
Poland	39	14	33	36	32	29
Rumania	56	45	56	58	59	36
USSR	83	71	60	81	62	59

Source: Statistical Yearbook 1979 of CMEA countries.

ues forage and grass production. High feed grain prices enhance areas with good grass production capabilities and will stimulate grassland research. A significant proportion of ruminant production is based on imported feeds and development in this sector therefore has implications for the trading policies.

Higher energy prices may well force changes in the diets of animals and highly fertilized grassland may then become less attractive.

It is clear that the amount of research aiming at raising the production of grassland in all countries (East and West) is very much influenced by government priorities. Unfortunately data on research and development funds for the various sectors of agricultural research were not at our disposal. Further study in this direction could be illuminating especially if analysed in relation to cost-return relationships.

An examination of the share of state and cooperative farms in animal production in Eastern European countries did not reveal any clear pattern. It cannot be concluded that governments have systematically more (or less) influence in sectors of ruminant production (see Table 6).

Agricultural policy in Eastern Europe will probably continue to stimulate animal production by directing producers to this sector and by stimulating research to achieve productivity gains via technological advance. Concentration, specialization and industrialization are most advanced in the production of eggs, poultry and pigs. It is more difficult to achieve such progress in ruminant production. These animals need more individual care and they are less able to withstand the vigours of standardized management. Breeding cows under standardized conditions means that more attention has to be paid to health and the length of productive life than to yield per lactation. But progress in the former goals are harder to achieve. High concentrations of dairy cows create new problems in cow feeding, oestrus detection, etc. With new developments in computer application there is considerable scope for improving herd control and information systems. However, technology cannot solve all problems.

Prospects for grassland production in Eastern Europe

Utilization of grassland as a feed input in ruminant production can be improved in various ways. First, an increase in consumer demand for grassland products can be an incentive to increase grassland production. Second, changes in production methods of grassland products (which may be independent of an increasing demand) may lead to a larger need for grass as a feed input. Third, changes in international trade relationships may influence grassland production. Fourth, development in grassland research may have a stimulating influence on future utilization of grassland. Below, the first and second aspects are considered only.

In a long-range study of the European Association for Animal Production (EAAP) projections have been made for developments in demand and production of various grassland products until the year 2000. These projections are based on studies by the Economic Commission for Europe (ECE) in Geneva, the Food and Agriculture Organization of the United Nations (FAO) in Rome, the Organization for Economic Co-operation and Development (OECD) in Paris, the Statistical Office of the European Community (SOEC) in Luxembourg, the World Population Prospects published by the United Nations Organization (UNO) in New York, and on national statistics in various countries.

The results of these studies and statistics were put together and adjusted into a series of projections as a basis for discussion in the EAAP study groups on various animal species. In adjusting the data from the various sources, the group on economic and structural changes tried to include various constraints and information on historical performance. For the Eastern European countries, however, the resulting projections were strongly influenced by the countries' economic plans. It was assumed that these plans will be put into effect.

Prospects for demand

The domestic demand for a commodity is determined by the size of the population and per capita consumption. In market economies the latter is determined by price, income level, taste and preference. In centrally planned economies it seems that the regulatory functions of price and income are less important and that factors like distribution and availability have a larger impact on aggregate consumption levels. Both economic systems, however, have developed ways to pass on advantages of productivity growth to the ultimate consumer. In market economies this regulation is brought about through rising incomes and changed prices which allow consumers to buy more or higher-quality foods. In the past, due to an increasing productivity (inside and outside agriculture) relative food prices have decreased and with higher incomes, grassland products, being one of the higher quality food items, have been consumed more. With a continuing economic growth in Eastern European countries similar developments will take place via commensurate planning measures such as price policies. Such measures refer to the level of state procurement prices paid to producers and administered retail prices that can, in fact, result in subsidizing consumers. This pursuit of stable and low consumer prices must be seen in the light of the lower level of general productivity per capita. However, problems may arise

PROSPECTS FOR GRASSLAND UTILIZATION IN EASTERN EUROPE

Table 7. Projected demand for grassland products in the year 2000.

	1978 consumption		Population growth 1980-2000 (%)	Consumption growth 1980-2000	
	milk ¹ (kg per capita)	ruminants ²		milk (%)	ruminants (%)
Bulgaria	210	18.5	4.8	43	64
CSSR	368	27.2	10.7	20	32
GDR	488	23.6	0.0	-5	20
Hungary	224	12.0	2.9	34	42
Poland	513	21.4	12.9	10	43
Rumania	212	15.4	17.0	36	65
USSR	365	29.1	17.4	31	45
Eastern Europe	368	26.6	15.2	26	43
EC-9	372	28.7	4.7	6	22

¹ In milk equivalents, including feeding.

² Includes beef and veal, mutton and goat.

Source: EAAP (1982).

from a widening gap between consumer prices and rising producer prices. This conflict is exaggerated when consumer demand for quality and convenience in food products is increasing.

The EAAP demand projection for Eastern European countries is shown in Table 7. The expected population growth (15.2 % versus 4.7 % in the EC-9) is thought to be the most important stimulating demand factor. Real income per capita is projected to grow at 2-4 % per year. This is much lower than the growth rates realized in the 1970s. Yet in view of the changed international conditions facing individual Eastern European economies, these figures seem realistic.

Possible developments in consumer price have not played a significant role in these demand projections since they are an instrument of economic policy rather than regulatory instruments on their own. Consumer tastes and preferences, however, are assumed to have a potentially large impact on future demands for grassland products. In the past most governments have put emphasis on attaining certain quantity levels of food production, the quality of which often was subsidiary. As reasonable per capita consumption levels have now been reached, it is to be expected that consumers will try to increase their consumption of higher quality meats and (to a lesser degree) dairy products.

The EAAP projections are based on these assumptions. In countries with high per capita consumption levels of milk (GDR and Poland), total milk consumption is projected to grow less than the total population. For ruminant meats projected consumption increases are considerably higher. They differ among countries and seem to close the gap between the present per capita consumption levels and the ambitions of the governments plans. Projected growth rates for both milk and meat consumption are considerably higher than in EC-9 countries. By implication, increased attention to the industrial processing of grassland products is more than justified,

Table 8. Projected development of sheep and cattle numbers and milk production per cow. 1960: kg/cow, 1980 and 2000: index numbers (1960 = 100).

	Sheep		Cattle		Milk yield		
	1980 (index)	2000	1980 (index)	2000	1960 (kg)	1980	2000 (index)
Bulgaria	105	166	112	163	1393	159	215
Hungary	137	360	98	100	2245	134	178
GDR	101	125	122	78	2650	145	189
Poland	95	196	130	86	2107	145	189
Rumania	138	185	143	118	1120	181	223
CSSR	139	100	114	83	1890	160	212
USSR	86	134	125	138	1780	124	154

Source: EAAP (1982).

especially when comparing the Eastern European state-of-the-art with current technology in Western Europe.

Prospects for production

The EAAP projections of ruminant production in the year 2000 are in accordance with the projections of demand. Slight deviations may occur in various countries, but it is generally projected that countries will become self-sufficient in all major foods.

Combining this with prospects of technical developments in the next 20 years, the EAAP study also provides projections for animal numbers and yield levels per animal on which the total production projections are based (see Table 8). The data in Table 8 indicate the tasks set for the ruminant production sectors. The prospects for total production of the various categories should be regarded as a maximum in view of the achievements in the past two decades.

Summary and conclusions

The economic importance of grassland can only be analysed adequately by studying grassland from its agricultural, economic and political aspects. This paper looks at the influence of these aspects on grassland production. A general conclusion is that the economic importance of grassland in Eastern Europe is less pronounced than in Western Europe. Various reasons which may account for this were given. The contribution of grassland to food supply is limited. In Eastern European not only do diets contain a smaller portion of grassland products, but grass is also a less important input for animal feed. Grassland does not play an important role in Eastern European agriculture. Little land (UAA) is under grass and low yields point to natural grassland farming. This study shows that ecological circumstances are not the only explanation for this situation. The existence of large scale animal production systems, a lack of flexibility in farm management (especially with respect to sanitation and animal feeding practices and the substantial political influence on prices and

production plans) can also explain why grassland production in Eastern Europe is only modestly developed. From this study it can be concluded that there is a need for more research on efficient use of available resources for grassland production. It seems that considerable productive potentials can be exploited via grassland production. It is therefore suggested that grassland research should be stimulated in order to realize these potentials.

In developing an adequate research policy, grassland researchers should keep an eye on the cost-return relationships of research efforts in alternative directions. Such insight can be gained by developing a consistent view on total ruminant production as a subsector in agriculture. By this approach the real obstacles to further improvements in grassland will emerge. Obstacles which cannot be solved by grassland research should be sorted out and may require adjustment of government policies, because such obstacles often originate from rigid production structures. Rather than pursuing official policy lines irrespective of the basic natural and social conditions of a nation's agriculture, production structures will have to be adjusted according to productive possibilities, lest they become more inefficient.

Acknowledgement

The authors wish to express their appreciation for the detailed criticism made of an earlier draft by Professors M. L. 't Hart, A. J. H. van Es and J. G. P. Dirven.

References

- Amies, S. J. & S. R. Wragg, 1981. The role of grassland in milk production. In: J. L. Jollans (Ed.), Grassland in the British economy. CAS Paper 10, University of Reading, pp. 289-306.
- Burg, P. F. J. van et al., 1981. Nitrogen and intensification of livestock farming in EEC countries. Paper read before The Fertiliser Society of London, 23 April 1984.
- CEC, 1980. De toestand in de landbouw. Luxembourg.
- CMEA, 1979. Statistical yearbook. IPC Industrial Press, Londen.
- Csáki, C., 1982. Long-term prospects for agricultural development in the European CMEA-countries, including the Soviet Union, IIASA, Laxenburg, Austria.
- Dijk, G. van et al., 1982. Economic and structural developments. In: R. D. Politiek & J. J. Bakker, Livestock production in Europe. EAAP Publ. No 28. Elsevier Scientific Publishers, Amsterdam, pp. 9-64.
- EAAP, 1982. Projections of the utilization, production and self-sufficiency in European countries for milk and veal, pork, mutton and lamb, eggs and poultry. In: R. D. Politiek and J. J. Bakker, Livestock production in Europe. EAAP Publ. No 28. Elsevier Scientific Publishers, Amsterdam, pp 308-335.
- Kilkenny, J. B. & J. A. L. Dench, 1981. The role of grassland in beef production. In: J. L. Jollans (Ed.), Grassland in the British economy. CAS Paper 10, University of Reading, pp. 206-332.
- Lee, J., 1978. Land-use/beef production relations in the EEC with special reference to land capability. Paper presented on the EEC Seminar on the Future in the EEC Beef Production (Abano Terme, 1978).
- Lee, J., 1983. The spatial patterns of grassland production in Europe. In: A. J. Corral (Ed.), Efficient grassland farming. Proceedings of the 9th general meeting of EGF (Reading, September 1982). British Grassland Society, Birkshire, UK.
- Nederlands Voorlichtingsbureau voor de Voeding, Algemene voedingsmiddelentabel. Den Haag.
- OECD, 1981. Animal feeding and production: new technical and economic developments. OECD, Paris.
- OECD, 1981-1982. Prospects for agricultural production and trade in Eastern Europe, Vol. 1, 1981;

Vol. 1, 1982. OECD, Paris.

OECD, 1982. Problems of agricultural trade, OECD, Paris.

Thomas, W. J. K. & J. B. Kilkenny, 1981. The role of grassland in sheep production. In: J. L. Jollans (Ed.), Grassland in the British economy. CAS Paper 10, Univeristy of Reading, 306-332.

Wädekin, K., 1982. Agrarian policies in Communist Europe. Martinus Nijhoff, London.

Appendix A. Calculation of estimates of the share of grassland in total ruminant feed consumption

Very few data are available to indicate the importance of grass in ruminant diets. As an approximation of this Lee (1983) gave shares of grassland in total animal feed (see Table 9). These numbers give a somewhat misleading impression of the relative contribution of grass to ruminant feedings. In countries with a relative large poultry or pig meat sector (like France and Bulgaria) the importance of grassland is insufficiently expressed by these numbers. Therefore it was attempted to correct these numbers for the feed consumption of non-ruminants.

Assuming a linear relationship between production and feed use, an estimate is made of total yearly ruminant and non-ruminant feed consumption. Production data for 1978 are presented in Table 10, as well as conversion rates, to convert output into grain units. It has been assumed that these rates reflect food requirements for maintenance as well as for production. By using one set of conversion rates no provision was made for variations in efficiency in animal production among the various countries. Undoubtedly large variations exist, between as well as within countries, but unfortunately our data did not allow a more detailed analysis.

Calculations for total feed (TF) and ruminant feed (RF) are presented in Table 11. These estimates may not be totally correct, but they probably do give a fairly reasonable estimate of the relative size of ruminant versus total feed consumption.

The correction on the data in Table 9 (share of grassland in total animal feed: G/TF) can easily be executed by using the equation:

$$\% \text{ grass in ruminant feed} = (G/TF) \times TF/RF$$

The results of this calculation are presented in Table 4 of this paper.

Table 9. Estimated share of grassland in total animal feed consumption in EC countries (% feed units, 1978) and in Eastern European countries (% grain units).

<i>EC-9 countries</i>		<i>Eastern Europe</i>	
Belgium/Luxemburg	27.4	Bulgaria	21.4
Denmark	27.1	Czechoslovakia	32.0
FRG	36.4	GDR	28.3
France	51.7	Hungary	15.7
Ireland	82.6	Poland	32.3
Italy	30.6	Rumania	29.7
Netherlands	31.5	Yugoslavia	35.7
UK	57.9	USSR	44.8

Source: Lee (1983), CEC (1980).

PROSPECTS FOR GRASSLAND UTILIZATION IN EASTERN EUROPE

Table 10. Gross indigenous animal production (1000 MT), 1978.

	Ruminants			Non-ruminants		
	meats	milk	wool	pig meat	poultry	eggs
Conversion ¹	5.20	0.80	40.0	4.20	3.75	4.20
Belgium/Luxemburg	267	4 254	0.4	682	104	229
Denmark	240	5 482	1.8	815	98	71
FRG	1 455	23 587	4.5	2 998	350	852
France	1 914	32 205	22.2	1 656	963	793
Ireland	515	5 469	9.0	139	43	37
Italy	878	10 824	12.4	922	960	642
Netherlands	406	11 363	1.8	1 194	344	430
UK	1 226	17 996	49.1	876	726	836
Bulgaria	240	2 003	34.3	321	158	125
Czechoslovakia	426	5 707	4.0	910	161	243
GDR	471	7 405	11.0	1 184	135	308
Hungary	223	2 348	10.8	955	342	267
Poland	875	17 066	13.3	1 815	376	474
Rumania	364	5 597	35.9	810	356	336
Yugoslavia	406	4 276	10.2	785	253	203
USSR	7 934	94 498	460.0	5 243	1 885	3 554

Sources: for EEC: Eurostat, Yearbook of Agricultural Statistics 1976-1979; for CMEA: CMEA, Statistical Yearbook 1979; for N. America and for eggs: FAO, Production Yearbook 1980.

¹ Conversion factor for cereal units, as used in the Federal Republic of Germany in 1976-1977, taken from OECD (1981:186).

Table 11. Approximation of ruminant and total animal feed consumption in European countries, measured in cereal units (1000 MT), derived from animal production statistics (1978).

	Ruminant	Total		Ruminant	Total
Belgium/Luxemburg	4 808	9 024	Bulgaria	4 222	6 688
Denmark	5 706	9 795	Czechoslovakia	6 941	12 887
FRG	26 616	44 099	GDR	8 813	15 586
France	36 605	50 502	Hungary	3 470	9 885
Ireland	7 089	8 313	Poland	18 735	29 759
Italy	13 721	23 890	Rumania	7 806	13 954
Netherlands	11 274	19 385	Yugoslavia	5 940	11 038
UK	22 736	32 649	USSR	135 255	179 271

Source: own calculations based on data from Table 10.