

# Modelling livestock production systems within the EU for the purpose of policy appraisal

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## **Introduction**

The aim of the *ELPEN* Concerted Action is to consider how, given the great regional diversity of livestock production systems within the European Union, a modelling framework can be devised within which, the regional economic, environmental and socio-economic impacts of livestock policy options can be better appraised. Development of such a framework involves a consideration of how livestock production systems can be characterised for different appraisal purposes as well as how this information might be presented spatially.

Given that the framework is intended as a tool to improve the appraisal of policy, one of the concerted action's first objectives was to assess how policy-makers currently assess the impacts of policies for the livestock sector; how effective these current procedures are and, more importantly, where the deficiencies lie. The needs of policy makers in appraising policy proposals provide a starting point for constructing our common framework. The test for the project's final result will be how far it has been able to address these needs and in doing so improve the quality of livestock policy appraisal on a regional basis.

As already mentioned, development of a framework involves a consideration of how livestock production systems can be characterised and classified for different appraisal purposes. This will be determined, to a large extent by the needs of policy makers, but will also necessitate an assessment of which:

- impacts, e.g. economic, environmental, are to be appraised
- indicators can be used to characterise livestock production systems for different purposes
- level of spatial aggregation appraisal should be undertaken at,
- data sources are available with which to do this.

## **Policy makers' needs**

### *Methodology*

We decided that the needs of policy makers in appraising the impacts of livestock policy options would be determined by holding a series of interviews with officials currently involved in livestock policy appraisal in:

- (i) the European Commission and
- (ii) selected national administrations

It was not practical to visit all 15 national administrations and so the following were selected, as being representative of the diversity of livestock systems, geographical situation, structure of national administration and data collection procedure within the Community: Germany, France, Sweden, Austria, Greece and the UK.

At the European Commission we interviewed officials in DGVI, the agriculture directorate, and the division responsible for agriculture within DGXI, the environment directorate. In DGVI we spoke to the divisions responsible for policy analysis and strategic planning, agri-environmental schemes, the Farm Accounts Data Network (FADN) and the commodity sector for milk and milk products.

The officials we interviewed in national administrations were all involved in the process of livestock policy evaluation and included representatives from commodity divisions involved with day-to-day management of common market organisations, as well as economists and national representatives in international agricultural negotiations. We also talked to officials involved in implementing agri-environmental schemes (Regulation 2078/92), managing policies to support organic farming (as part of Regulation 2578/92) and rural development. Exactly which officials we interviewed in each Member State depended on the structure and division of responsibility within each national administration.

Most of the officials we interviewed in national administrations worked in Ministries of Agriculture, although in one or two Member States we also spoke to representatives from farmer's unions, for example the *Fédération Nationale Bovine* in Paris and the *Landwirtschaftskammer* in Vienna. Farmers unions undertake a significant amount of research to support their positions and for the purposes of this project are in an equally good position to identify the deficiencies in current appraisal procedures and the type of livestock system models that would contribute to policy analysis. In Austria the political system even grants the farmers' union a formal, institutionalised role in policy-making.

In Germany, given the nature of the federal system we interviewed officials in both the national Ministry of Agriculture in Bonn and officials in one of the *Länder*, i.e. Saxony. In Sweden the situation was slightly different again and we met officials from the Board of Agriculture, an independent agency, much larger than the Ministry of Agriculture, which is primarily responsible for the implementation of agricultural policy, and upon whom the Ministry relies heavily for information.

Having already identified the areas it would be necessary to address in order to develop a common framework for the appraisal of livestock policy on a regional basis we compiled the following list of areas for discussion in our interviews with policy makers:

- The type of impacts currently analysed
- The data sources available
- Methodologies
- Indicators used to characterise livestock production systems
- Key policy issues which might determine the type of future appraisal necessary

- Level of spatial aggregation, and
- Any typologies of livestock systems already elaborated.

The interviews were semi-structured and based upon a topic check-list (Table 1). The topics covered in each interview depended upon the responsibilities and knowledge of the interviewees.

**Table 1.**        **Elaborated Interview Aide-Memoire**

<b>Type of impact currently analysed</b>	Structural Environmental Economic Rural Economy UK/EU or world markets
<b>Data Sources</b>	Local National EU
<b>Methodologies</b>	Models Used
<b>Indicators used to characterise livestock systems</b>	Environmental Economic Socio-economic
<b>Key Policy Issues</b>	Agenda 2000 Next Round of WTO negotiations Reform of the commodity sector Modulation Regulation 2078/92
<b>Level of Spatial Aggregation</b>	Parish Region NUTS III National EU
<b>Livestock System Typologies</b>	Any typologies already in use either at national or EU level

To facilitate discussion, maintain a degree of continuity between the different interviews and to make sure our results were relevant to current policy appraisal needs we used the appraisal of Agenda 2000 as a vehicle for discussing the merits and limitations of different national administration's appraisal procedures. Agenda 2000 was also used as an interview vehicle with the European Commission, but in that case it was the methods used to assess alternative policy formulations for impacts on the livestock sector that were considered. We were particularly interested in which impacts could not be appraised due to, among others, insufficient data, data at inappropriate spatial scales or inappropriate models.

#### **Current appraisal methods**

## *Impacts appraised*

### *"Ideologies"*

The needs of policy-makers in appraising the impact of livestock policy options are not simply defined, but rather a product of many different elements. One of these elements is an overarching ideology, which determines the importance of issues in the livestock sector and in turn, which impacts it is necessary to analyse in greatest detail. For the Commission the distribution of impacts (by Member State, region and types of production) together with the trade and budgetary implications were paramount. Where spatial impacts (for example producer incomes, agricultural employment or competitiveness) are most important for a particular government, impacts on these areas were also the ones that received priority in analysis. The UK administration indicated the control of UK budget expenditure as its over-riding ideology, whereas in Sweden employment in agriculture and value for consumers were also ranked highly. In Germany and France impacts on agricultural competitiveness were of prime interest and in Greece and Austria a key objective was the maintenance of rural populations. These are just a few examples, but they help to illustrate the way overarching government philosophy is a determinant in the type of policy appraisal policy makers wish to undertake and the difficulties involved in establishing a general policy appraisal framework at a national level.

### *Economics*

Nevertheless, most of the policy appraisal undertaken in the past and the vast majority undertaken today concerns the wider economic impact of policy proposals, that is the impact on markets, prices, trade, incomes, consumption and national or EU budgetary expenditure. The actual extent of appraisal is largely determined by data availability, but in all cases both macro-economic appraisal at aggregate national or even EU level was undertaken as well as micro-economic or individual farm level appraisal. Some administrations also analysed policy impacts at an enterprise level, although only in France was the impact at the livestock system level analysed.

The dominance of economic impact analysis is both a reflection of the data sources available and the production-focused history of the Common Agricultural Policy (CAP), with its myriad subsidy schemes and price support mechanisms. If policies are aimed at the economic survival of the individual farm or commodity sector, it follows that appraisal will be concentrated on the economic impact of such policies.

### *Socio-economics*

Our findings were that the socio-economic impacts of policy proposals (including impacts in less-favoured and vulnerable regions) were less comprehensively appraised and responses ranged from an appraisal of the effects on employment in the agricultural sector in the European Commission and Sweden to no obvious appraisal at all in Saxony. Obviously, the impact of a particular policy on, for example, producer incomes, may tell us something about the impact of that policy on rural communities. However, economic analysis seemed to be overwhelmingly "static" in nature and very few predictive models were used to try and work out the longer-term effects on the

rural economy.

However, in some countries, such as Austria, the "multi-functionality" of agriculture, was seen as very important in maintaining rural populations widely distributed throughout the country, which was one of the government's primary objectives. Agriculture was seen as sustaining far more than just agricultural production, for example stewardship of the environment, maintenance of rural communities and infrastructure, as well as a series of related up- and down-stream activities. Notwithstanding the importance of these socio-economic aspects of agricultural production, our impression was that policy appraisal still focused on the economic survival of agriculture as such, it being implied that if agriculture survived so would its "external benefits".

### *Environment*

Appraising the environmental impacts of policy options is a relatively new process both in the European Commission and national governments, but has so far been severely limited by lack of adequate data. Certain Member States have undertaken national or regional studies to try and assess the impact of different policies on the environment. For example, the Swedish Board of Environmental Protection is currently undertaking a long term study on the environmental impact of the CAP, but it will be some time before this produces any conclusions or identifies meaningful indicators which can be used to assess the impact of policy proposals on the environment.

Given that relatively little analysis has been done in the past into the impact of livestock policies on the environment, the call for appropriate data has been small. However, since agricultural policy is moving away from production-orientated price support mechanisms towards support linked to environmental conditions, there is now a large interest and demand on the part of policy makers for greater information.

For example in Greece, environmental problems are generally not considered to be very significant; consisting of small isolated incidences associated with intensive production systems, over-grazing and, in some more remote areas, abandonment of pasture leading to increased risk of fire. As a consequence the government's primary concern is the severe and ongoing problem of rural depopulation. However, assessing environmental impact was still important, as it was likely to play an increasing role in policy formulation in the future.

Table 2 summarises the types of policy appraisal typically undertaken by national governments.

**Table 2. Summary of the impacts appraised by policy makers.**

<b>Type of impact appraised</b>	<b>EU level</b>	<b>National level</b>	<b>Regional level</b>	<b>Case Study</b>	<b>Enterprise level</b>	<b>Farm level</b>
ECONOMIC	X	X	X	X	X	X
SOCIO-ECONOMIC		X		X		
ENVIRONMENTAL				X		

*Data sources available*

The data sources used for the majority of policy appraisal at both national and EU level are almost exclusively those containing data gathered at an EU level, i.e. Eurofarm (Eurostat), the Structural Survey as well as the Farm Accounts Data Network (FADN) and some market data. However, the FADN is not representative of Greece, which has a large number of very small farms, below the minimum size threshold for inclusion in the data-base. To a certain extent this is also a problem for other Member States.

For policy appraisal at a regional level the detailed national contributions to the aggregated EU level data-bases are used as well as information on slaughterings, support claims and the Integrated Administration and Control System (IACS). In some cases data from non-agricultural data-bases such as UK Home Office statistics or land registry information were also used.

For the appraisal of economic impact at a national level the general feeling was that current data-bases were adequate, although for regional impact analysis the sample of farms used for data collection often meant that existing data-bases were unrepresentative and misleading. However, at this level data-bases could be cross-referenced and validated one against the other, which was an important part of the appraisal process. Another problem was the incompatibility of different data sets, both at EU, national and regional levels, which in many cases reduced the range of impacts which could be appraised.

The main needs for additional information by Member States were identified as regional information on livestock systems in other Member States (as this was impossible to derive from the European level data sets currently available) and environmental and technical information on the way in which different livestock systems are actually managed. This was seen as essential, given that future policies were likely to be aimed at certain management practices, and carry environmental conditions. Information was also lacking at regional, national and EU levels on animal welfare, organic and part-time farming.

*Methodologies use in policy appraisal*

The methods of policy appraisal used in national administrations and the European Commission were very similar, including both a macro-economic, sector by sector approach as well as an individual farm-level approach based on identified farm types. These farm types were then incorporated into models to predict average policy impacts, either for the entire nation, the sector or a region. Appraisal of regional impacts was, however, relatively rare as farm types could not usually be related either

to actual numbers of farms or geographical location.

In some cases, for example France, Austria and Saxony, the results produced by farm-type models were cross-referenced against data collected on actual farms corresponding to the farm types identified. This was seen as an essential process in validating results and ironing out any anomalies which might arise from data set deficiencies or the process of aggregation.

The exception was Greece, where the appraisal of policy was less formalised and technical, emphasis being placed on consultation rather than modelling. However, this could be attributed to the fact that the consequence of the CAP has been a marked shift away from livestock production and into crop production. This shift is also reflected in policy appraisal procedures as well as data availability.

"Agricultural Policy Boards" of up to 200 people were created after the 1992 CAP reform, the intention being that they would provide general agricultural policy guidelines and a voice for farmers. The Board is composed of policy makers, representatives of the livestock sectors concerned as well as technical experts, often from research institutes or universities. Despite the Board's original objective to provide general agricultural policy guidelines, it has evolved into a significant source of technical expertise. This is particularly important to policy makers at a time when the number of Ministry officials who are actually agricultural specialists with expert knowledge of the particular livestock sectors concerned is declining. To compound the problem, the Ministry's extension services, previously also a source of technical expertise, have recently been reduced in size and had their role changed to that of administering EU market schemes.

The type of models operated by policy makers depended upon the type of impact under appraisal and this was in turn determined by a complex interaction of elements, which will be elaborated upon later. In some Member States, for example the UK, models have been devised which take into account not only changes in the policies of the sector in question e.g. beef production, but also include the knock-on impact on farm businesses of changes in related sectors, such as cereals. However, as already mentioned, the vast majority of policy appraisal is "static" with very few predictive models used to determine longer term impacts. In certain cases it was even considered unnecessary to do this, except in the case of environmental impact, as it was considered to be virtually impossible to tell how individual farmers would react to policy changes in their farm management.

#### *Indicators used to characterise livestock production systems*

There was an overwhelming consensus that the greatest need for indicators was for meaningful and easily quantifiable "environmental indicators", which could relate different systems of livestock management to their environment. As already explained the need or wish on the part of Member States and the European Commission to appraise the environmental impact of livestock policies is a relatively new one and, on the part of Member States (in the livestock sector, at least), largely policy driven. One of the biggest challenges facing the *ELPEN* project is how to identify meaningful and quantifiable environmental indicators, which can either be found within existing data

sources or for which additional data needs to be collected.

For example, one of the questions repeatedly raised was how to identify meaningful indicators of “farming intensity”. Future policies in the livestock sector look set to favour “extensive” over “intensive” farming practices on the grounds that these are beneficial to the environment. However, policy-makers in both the European Commission and national governments are struggling to identify what is and what is not an “intensively managed” farming system and the distribution of farms between “intensive” or “extensive” systems.

Various potential or proxy indicators were mentioned to us during the course of our interviews, but none was ideal and all had serious drawbacks. Proxy indicators currently used produce rough estimates, including stocking densities, area under maize silage, number of bulls or steers raised, physical size of farm and topography, but none of them is an exact indicator of management practice. In some cases data exists on how specific farms are managed at a local level, but it is impossible to aggregate this up to a national level in a meaningful way.

As far as economic indicators are concerned, again there was a general consensus that sufficient indicators existed for the types of appraisal currently undertaken. The need for socio-economic indicators on the other hand was less clearly expressed, but related to the importance attached by governments to appraising the socio-economic impact of policy proposals. Given that responsibility for rural development generally lies with divisions, other than those responsible for livestock policy, our conclusion was that the need for socio-economic indicators may have been more forcefully expressed had we interviewed policy makers other than those involved in the appraisal of livestock policy.

### *Key Policy Issues*

As already explained above, current policy issues and future policy directions do have a direct effect of policy makers’ needs in appraising the impact of livestock policy. It was clear from our interviews that Agenda 2000 and future reform of the CAP are already playing an important role in the type of appraisal policy makers wish to carry out. For example, there is a need to be able to link types of livestock systems to specific management practices and geographic location and in turn to link management practices to location-specific environmental impacts, either beneficial or not. This information was also needed in order to be able to devise, implement and evaluate agri-environmental schemes (Regulation 2078/92).

It is interesting that countries as diverse in their political ideologies as Austria and Sweden, both agreed on the need for information linking management practices to environmental impact. Austria saw agri-environmental schemes as a means of providing farmers with essential subsidies to produce environmental goods, whereas Sweden was of the opinion that environmental goods need to be quantified in order that the market should be made to pay farmers for producing them.

A need for further information on organic farming was also identified, for similar reasons to those given above, and on animal welfare, which, again in the case of

Sweden, needed to be quantifiable so that ways could be devised in order for the market to pay.

### *Level of spatial aggregation*

In addressing the level of spatial aggregation at which policy makers need to appraise livestock policy options, it should be pointed out that not every country interviewed undertook appraisal at spatial levels other than a very aggregate, national one. As already outlined this may be for a number of reasons, including the difficulty of relating certain data sets to geographical locations and the difficulty of dis-aggregating “farm types” at a regional level. In very many cases policy-makers concentrated on average impacts, supplemented by general knowledge or local expertise as to where actual “farm types” are located.

In a number of countries, including France, Austria and Germany direct monitoring of a large number of farms allowed general conclusions to be tested against real situations and this greatly increased the quality of the resulting appraisal.

Nevertheless, EU-level data sets, such as Eurofarm do permit a level of spatial aggregation to NUTS III (NUTS are standard Eurostat territorial/regional units upon which the collection of EU statistical data are based. There are 1031 NUTS III regions in the EU.). This can be useful in giving a general geographical overview of where policy impacts will be felt but, according to officials in DGVI, this needs to be flexible as for some purposes NUTS III is too detailed and needs to be aggregated and for other purposes it is not detailed enough. Given that NUTS are also Eurostat determined regional units, they do not correspond to national administrative boundaries and are therefore largely incompatible with national data sets, combination with which would greatly enhance the level of appraisal which could be undertaken.

The need identified here by policy makers was to be able to relate existing data sets to geographical location and to have access to information on the regional distribution of different livestock systems in other Member States. This is difficult to derive from EU-level data sets, which are only available in an aggregated form.

### *Typologies*

Typologies of livestock systems have, in the past, tended to be largely market or production determined and not spatially indexed, due to the lack of adequate data. General and local knowledge is relied upon to give a broad regional overview of where specific types of livestock systems are located. In many cases even the number of farms belonging to each type is not known. This is acceptable if aggregate economic impact is the only one a policy-maker wishes to appraise, but as already explained, new policy directions have greatly increased the range of policy impacts which need to be analysed. For example, in Austria it was admitted that the typology of livestock systems currently used was of little use in appraising the impacts of Agenda 2000 on the Austrian livestock sector.

In several cases the national typologies devised are not representative of actual farm numbers, but reflect perceptions of how important to, or characteristic of, the national

livestock sector different systems are. For example, in Sweden the concept of livestock systems was said to be alien to the dairy sector, where systems were virtually homogenous. Conversely France has identified tens of different dairy systems.

Policy makers identified the need to be able to relate typologies of livestock systems to regional location and to specific management practices, which might tell them something about the relationship of a particular system with its environment.

### **Policy Appraisal**

We concluded that the type of policy appraisal policy-makers undertake, or wish to undertake, is the result of a number of inter-related factors and not simply an objective process, limited only by feasibility (in terms of available data, models, time and cost). The types of policy impacts appraised by policy-makers, how and to what extent this is done, also all differ, both between individual Member States and between Member States and the European Commission.

We can conclude that the factors which determine the nature of policy appraisal undertaken by policy-makers are, among others: livestock policy issues, and the wider political agenda and ideology of the government in question. The latter may determine the hierarchical importance of potential impacts and determine which ones are appraised and which are not. For example, in Sweden employment in the agricultural sector is of great political importance and almost every new policy proposal is appraised for its potential impact on agricultural employment. Similarly, in the UK the government's main objective is to reduce expenditure on the CAP and consequently every new policy is appraised for its potential cost to the EU's agricultural budget and its implications for UK public expenditure.

Feasibility is also an important factor, both in terms of the time, data, appropriate models, and resources (both technical and financial) available for the appraisal of a particular policy.

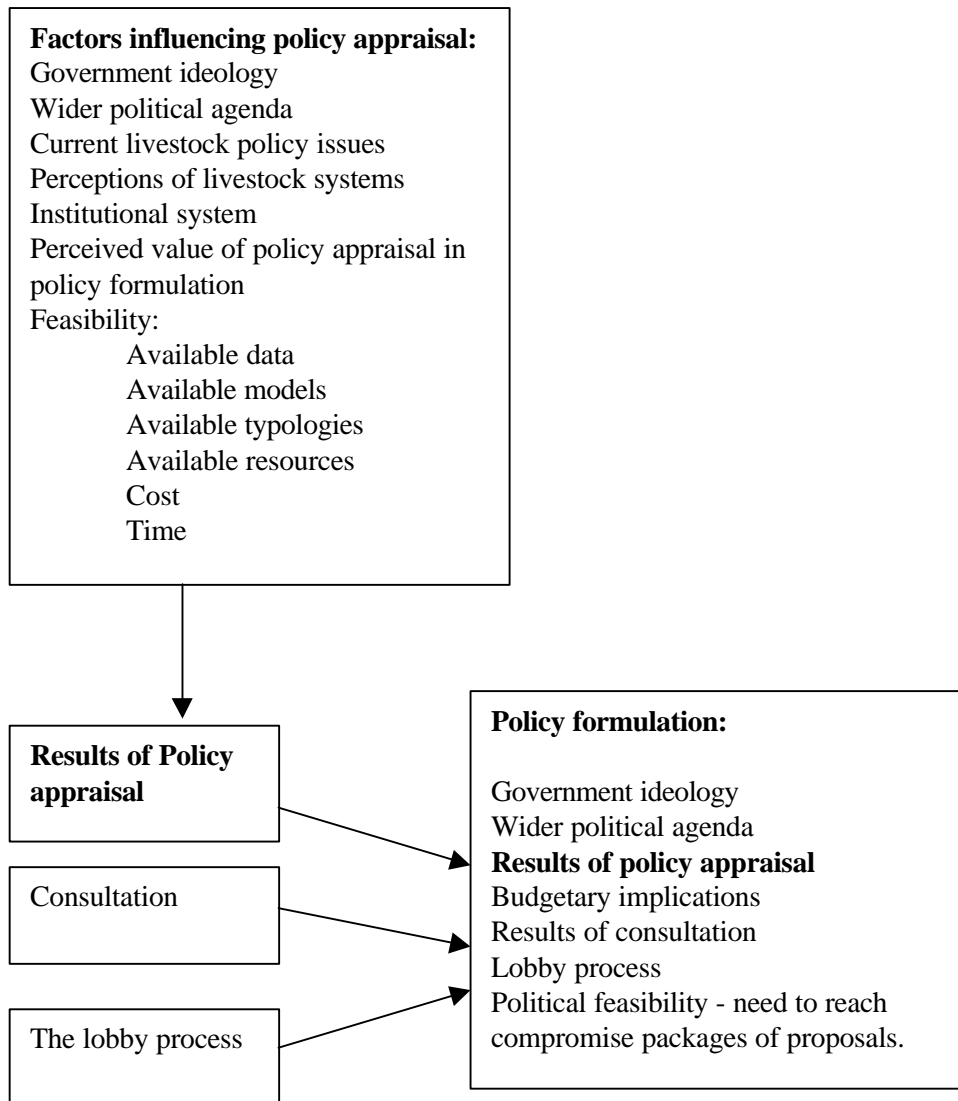
Policy-makers' perceptions of the relative importance of certain livestock systems may also determine what type of policy appraisal is carried out. For example, in the UK, it is argued that the large farm structure is essential to the competitiveness of the livestock industry and consequently, much attention is focused on appraising the impact of any proposed modulation of policy support. A country like Austria, with a structure of relatively very small farms, conversely has no need to analyse the impact of modulation in any detail.

Finally, it should be mentioned that a very important factor in determining the type and extent of policy appraisal which policy-makers wish to undertake, is the importance they attach to the results of policy appraisal in the decision-making or policy-making process. It was stressed several times during our interviews that policy-makers viewed the process of policy appraisal as just part of the much wider process of policy-making (Figure 1). There was a reluctance to rely too much on the results of policy appraisal, as a result both of data limitations and unreliability and the difficulty of predicting farmers' long term responses to policy changes.

Policy formulation is also a complex process involving several inter-related elements of

which policy appraisal and its results are only a part. Other elements include, the wider political agenda, the government's overarching ideology, the consultation and lobbying processes (which in some cases are relied upon by policy makers to provide policy appraisal), political as well as practical feasibility and, of course, the need to reach political compromises and agreements.

**Figure 1. The role of policy appraisal in policy formulation.**



## Conclusions

### *Policy makers' needs*

Although certain common "needs" or requests for information were identified in our interviews in response to the discussion areas outline above, differences between the European Commission and Member States in terms of how, where, how much and what type of policy appraisal is currently undertaken were also highlighted.

One of the most often repeated requests was for technical data on how different livestock systems are managed. This is important as livestock policies shift their focus away from production and towards different management practices. The environmental impact of livestock systems is coming under increasing scrutiny and another common need identified was for meaningful environmental indicators. These indicators should enable policy-makers to relate different livestock systems and management practices to their environmental impact.

As the focus of livestock policy shifts away from production so too the relevant policy indicators change. This not only means that new indicators need to be identified to meet the new policy issues, for example, how should intensity of production be quantified, but also that newly identified indicators then need to be incorporated into existing models of livestock systems. An example of this is the recent change in policy on maize-silage and how this needed to be incorporated into existing models of livestock systems to show the knock-on effect this policy would have on the livestock industry.

A need was also identified for models to relate different livestock systems to specific geographical location. This is not always possible using existing models, but is extremely important when assessing the environmental or socio-economic impacts of livestock policy as these are location specific.

The differences in how, where, how much and what type of policy appraisal is undertaken were the result of a number of factors. For national administrations these included the institutional structure of the administration, the quality of existing national and regional data as well as the predominant livestock systems under consideration, for instance, changes in the policy in the sheep sector are not of major importance to the Netherlands. In Germany the federal structure of the government means that regional impact analysis is very important and is usually carried out in the relevant *Länder*, where regional data is available. This is in contrast to a country, such as the UK, where the national administration is only able to undertake limited regional impact analysis based on information collected for the FADN.

Also of importance were the models of livestock systems available and the perceived importance of certain livestock systems to a particular Member State. For example in Austria, the maintenance of small-scale upland dairy farms is seen as paramount in maintaining an even distribution of population throughout these disadvantaged regions; one of the government's primary objectives. Impact analysis, therefore, tends to concentrate more on these systems and less on lowland systems, which have parallels in several other Member States.

At an EU level policy appraisal is generally undertaken at an aggregate EU level, rather than a regional level. This is partly due to reliance on EU level data sets and partly because appraisal here is usually used to assess the merits of different policy options in the process of policy origination rather than appraisal of the effects of proposals already on the table. However, a need was identified for models that would enable regional impacts to be appraised. This was seen as extremely important in assessing the impact of policies in favour of farming practices beneficial to the environment, given that environmental impacts are to a large extent location specific.

*Issues in improving livestock models and inputs.*

As a result of the interviews carried out with policy-makers, the following issues (summarised in Table 3) have been identified as important in improving the modelling of livestock systems for the purpose of livestock policy appraisal.

**Table 3. Issues in Modelling livestock systems.**

Scale	EU National Regional
Data Sources	EU National Regional Combination of different sources Restriction to available sources
Model attributes	Economic impact Environmental impact Socio-economic impact Incorporation of policy changes in other sectors Flexible model Geographically specific
Future policy issues	Agenda 2000 WTO Round Environmental

*Scale:*

We concluded that at the moment most policy appraisal undertaken by the European Commission and Member States is at an aggregate EU or national level. This is due to reliance on EU-level data sets and the difficulties of dis-aggregating information to a regional level. It also reflects the fact that appraisal has largely been production and market orientated, where geographical context is less important than in, for example, the appraisal of environmental impact.

The issues which need to be addressed are:

- At what spatial scale should models of livestock systems be developed, i.e. EU, national, regional?
- Does this depend upon the impact under appraisal? and
- If so, should several individual models at different scales be developed or is it possible to build just one flexible model?
- How will the model attributes differ between different scales?

*Data Sources:*

As regards the data sources the main issue is whether the models developed should be restricted to existing data sources or whether identification of meaningful and relevant indicators should be the main concern, with availability of appropriate data secondary?

One of the major problems of restricting models to existing data sources is that the data source attributes tend to reflect traditionally market and production orientated appraisal and lack attributes relevant for the appraisal of, for example, environmental or socio-economic impacts. Similarly there are problems of compatibility between existing data sets at different scales, in terms of the attributes included, the rate at which data is collected and the number of data collection points used.

If data availability is not a prerequisite for the development of models for livestock policy appraisal, the project will be able to identify lacunae in existing data sources and perhaps lend weight to the Commission's recent attempts to include new attributes in both the FADN and the Farm Census 2000. These Commission proposals reflect the limitations of existing data set in appraising environmental impacts and the need to identify new environmental indicators. The proposals have so far met with opposition on the part of Member States, with the primary objections being the cost and practicality of additional data collection.

However, other issues include feasibility and how far it is possible to identify meaningful proxy indicators, which may already exist in current data sets.

#### *Model Attributes:*

The issue of model attributes is a very important one as the attributes included will dictate the impacts which can ultimately be appraised. As with the issue of scale, the question of whether or not to develop different models for the appraisal of different impacts or whether to develop a flexible model, which is able to cope with all the required impacts, will also need to be resolved.

As outlined above, traditional models of livestock systems have tended to focus on the appraisal of economic impacts on, among others, markets, production, trade and agricultural incomes, and the attributes used have reflected this. Now, however, the need is for technical information about how livestock systems are managed and how this relates to the immediate environment, cultural landscape and biodiversity. Consequently new attributes will need to be identified. In all these areas the impact of policy is very much subject to local "context" and therefore in order to appraise impact, it should be possible for attributes to be related to specific geographical location and number of actual farms.

Another issue for consideration is whether and how to devise models, capable of appraising the impact of policy changes in sectors other than livestock on the livestock industry. This may become increasingly important as policy shifts away from production towards favouring management practices perceived as favourable to the environment. For example, a reduction in support for fodder crops predominantly used in intensive livestock systems may be used as a way of encouraging the "extensification" of livestock production.

*Future Policy Issues:*

Finally there is a need to consider how to take into account future policy trends in the models developed. For example, if policies are likely to target livestock management practices favourable to the environment, it should be possible to use the models developed to assess the environmental impact of livestock systems and so distinguish those that are beneficial. Another important issue is the identification of future "policy drivers", such as production intensity, which may be used to discriminate between systems for policy purposes in the future. These issues need to be addressed before beginning the task of modelling livestock systems for policy appraisal.