SGM-calculation of costs in Denmark

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Abstract

The typology of agricultural holdings has been used in Denmark since 1980. The typology is based on calculated Standard Gross Margins (SGM) for individual activities of agricultural production (crop or livestock category). The typology makes it possible to classify all agricultural holdings according to types of farming and economic size.

SGM calculations in Denmark are based on results from Agricultural Account Statistics and Horticultural Account Statistics. To illustrate the quality of source data, explanations of sample selection plans and weighting procedures are available.

This working paper contains detailed information about the specific costs for each agricultural activity, and is based on data related to 2001. Most of the specific costs are recorded in the farm account as a single entry for all activities. Econometric modelling makes it possible to distribute the specific costs to the related agricultural activities. Further, the model makes it possible to estimate distributions to activity level of capital input, labour input, subsidies, short-time and long-time fixed costs. But only results about specific costs are used in the context of SGM calculation.

The SGM calculation includes accounts from conventional farming and organic farming as well. Condition of production has an important bearing on the economics, and differences are discussed for a few activities.

The quality of calculated SGM (outputs and costs) is validated. Data in the Farm Structure Survey from individual holdings about crops and livestock are multiplied by estimated outputs and costs, and the results are compared with results in macroeconomics statistics, as 'Economic Account of Agricultural' (EAA). The results prove that elements from the SGM calculation could be used in macroeconomic calculations.

Preface

Standard Gross Margins (SGM) are normally used in the EU typology system. The EU Commission - furthermore - wants to extend the use of SGMs. This is not entirely due to an interest in the SGMs themselves for reasons of typology, but there is also an interest in using SGMs and in particular the input costs (which are an element of the SGMs) in economic models.

This project is the first step in improving the comparability of SGMs. The aim of this working paper is to give a substantial and clear description of the sources and methods used to compile the SGMs for each agricultural activity in the typology classification. All 15 EU Member States have the opportunity to participate in the project.

Preparation of this working paper has been possible with financial support from the Commission of the European Communities. The original project title is "Specification of cost in SGM calculation in Denmark. Description, validation, use in classification and possible improvements of quality of methods". The work has been carried out in close co-operation between Statistics Denmark (DS) and the Danish Research Institute of Food Economics (FOI). DS is, among other things, responsible for the Farm Structure Survey, and Economic Account of Agricultural. FOI is responsible for calculating SGM in Denmark and is also responsible for the work performed in relation to the Farm Account Data Network.

Statistics Division, September 2003.

Vøgg Løwe Nielsen

Contents

1. Introduction

The purpose of this paper is to give a substantial and clear description of the sources and methods used to compile the SGM (Standard Gross Margin) for each agricultural and horticultural activity in the typology classification. Special consideration will be given to specific input costs:

- Seeds and planting stock
- Energy and lubricants
- Fertilizers and soil improvers
- Plant protection and pesticides
- Veterinary expenses
- Animal feeding stuffs
- Other direct costs

To fulfil this aim of the project, it is looked at as a whole, and the calculation of outputs is also mentioned. The descriptions will be based on data related to 2001. The data source for the calculations is 2.238 accounts, collected for the national earnings and costs statistics. These accounts are also made available for FADN (Farm Accounting Data Network). The sample consists of accounts from 310 horticultural farms and 1.928 agricultural farms. About 308 accounts are related to organic farming (19 with horticulture and 289 with agriculture). Explanations of sample selection plans and weighting procedures will be available to illustrate the representation of source data.

Most of the specific costs are recorded as a single entry for all activities in the original farm account. A distribution to actual activities has to be made. Each account is converted into a *gross margin account* at activity level, where specific costs are allocated to actual activities. The econometric model for this purpose will be explained. The distribution of costs is based on estimated key figures, reflecting the average cost per unit. The key figures are estimated every year in a multiple linear regression-analysis model with data input from all accounts. Practical examples will explain how the econometric model uses results from the regression analysis.

The model is able to estimate costs to the level mentioned above. Meanwhile, this specification goes into further details than those of the SGM definitions. In general,

lubricants and fuel oil for machinery should not be included in the SGM costs. On the other hand, energy for heating, drying and lighting crops in greenhouses are, e.g. included.

The procedures outlined are mainly used for agricultural activities. Horticultural activities could be treated in the same model. However, costs for horticultural activities are for the moment calculated in a different way. They are based on results from account statistics for type of farming, where nearly 100 pct of the production comes from specific crops. The total value of specific costs is reduced by values related to the secondary[1] crops. The procedure is explained by way of examples with actual data.

For some less important activities the general methods are not appropriate, and figures need to be based on macroeconomic data sources, and some estimating is needed. These activities will be discussed.

Economics in conventional versus organic farming are illustrated for a few activities in chapter 10. It is not generally intended to split up SGM for organic and conventional farming.

Finally, the calculated costs are validated. Data sources for validation of the specific costs and their representativeness is the macroeconomic data used by Statistics Denmark in compiling the Economic Accounts of Agricultural (EAA).

2. Use of typology and SGMs in Denmark

The typology is a EU-common classification system for agricultural holdings (in EU terms, agricultural often also includes the horticultural holdings). The typology was set up in the 1970 decade, and was designed to meet the particular information needs of the common agricultural policy. With reference to Commission Decision 85/377/EEC it could be mentioned:

"The purpose of the typology is to establish an instrument capable of supplying at Community level:

[1] 'Secondary crops' refer to other valid crops than the main activity.

- An analysis of the situation of farms based on economic criteria
- Comparisons between Member States or regions of Member States, and between different periods, of the situation on farms belonging to the various classes in the typology"

The typology of agricultural holdings has been used in Denmark since 1980. The typology is based on calculated SGMs for individual agricultural activities. The Danish Research Institute of Food Economics (FOI) uses the typology in the Danish Agricultural Account Statistics and Danish Horticultural Account Statistics. The FADN in Brussels also uses accounts collected for these statistics. The sample selection plans are mainly based on tables in which the population is classified according to type of farming and ESU (European size unit). Before preparing the final statistical reports a weighting factor is linked to each account. The calculation of weights is also based on data from typology tables.

Statistics Denmark is in charge of the Farm Structure Survey (FSS), and uses also the typology in sample planning and weighting procedures for years in which sample surveys are conducted. Many tables - based on the typology - are published every year in 'Agriculture Statistics'.

The Danish Agricultural Advisory Centre uses the typology on collected farm data in compiling statistics for advisory purposes. The aim of the Danish Agricultural Advisory Centre is to render advise to local Advisory Centres or even to the farmer himself. The Advisory Centres are owned by the Farmers' Unions.

3. Data sources for SGM calculation

In general, data are not collected specifically for the SGM calculation. Data collected for other purposes are used. The main source is a sample of accounts from agricultural and horticultural holdings. Data from the farm structure survey is also an important source, mainly as a basis for sample selection of accounts and later in assigning weights. The fundamental principles of sampling and weighting are explained in annex I.

3.1. Accounts from agriculture and horticulture

The main data source for the SGM calculation – concerning 2001 – is a sample containing 2.238 accounts collected for the national earnings and costs statistics. However, these accounts do not contain specified data about all activities; chapter 4 explains how to convert the data into a gross margin account at activity level. 1.928 accounts are from the agricultural sector and 310 from the horticultural sector. Most of these accounts are also made available for FADN, whereas 33 accounts from smallholdings have been collected only for the national agricultural accounts statistics.

For some activities of minimal importance - 'other poultry' for instance – there is a lack of data in the collected accounts. For completing the dataset, relevant data must be found in macroeconomic statistics or detailed data in specific publications.

3.2. Data from Farm Structure Survey

Data from the Farm Structure Survey (FSS) is made available for the sample selection and weighting procedures in the account statistics. Selection plans for year 2001 are based on FSS-data 2000. FSS-data from 2001 are used when assigning weights to each account, so the collected accounting data and data for weighting purpose refer to the same year. FSS itself can be based on a sample survey with questionnaires from about one third of all holdings. By using assigned weights for FSS 2001 the entire agricultural and horticultural sector is represented. The last large-scale survey refers to 1999. Sample plans for the account statistics are set up based on data about the enumerated sector.

4. Converting farm data into a Gross Margin Account

The data source for the SGM calculation for year 2001 is the 2.238 accounts collected for compiling Agricultural and Horticultural Account Statistics. These accounts contain data about business transactions – earnings and costs into and from the farm. Farm economics among farm activities are not reflected. For this purpose each account from the agricultural sector is converted into a *gross margin account* in a computer-based econometric model. The converted data are referred to as the *expanded data source*. In this layout, all outputs, costs, labour input, maintenance etc from each

farm, are distributed to specific activities[2]. Statistical results from full-time farms are published in a special report, *Economics of Agricultural Enterprises* with an English abstract. Results are also available on the Internet http://www.foi.dk/data/Serie_B_2001/Serie_B_forside.htm.Time series data for all activities are accessible via excel spreadsheet[3].

Tables 1 and 2 show results for wheat for the two regions in Denmark. Accounts from full-time farms as well as part-time farms are used in the SGM calculations.

Table 1. Wheat, regions and the whole country, physical data and capital input

			Denmark	
	Islands	Jutland	2001	2000
Number of holdings	10 667	17 232	27 899	28 210
Number of accounts	428	834	1 262	1 200
Ha per holding	24	22	23	22
Crop yield, hkg per ha	81	71	75	74
Product price, DKK per hkg	82	86	84	83
Labour input, hours per ha	18	17	17	17
	DKK per ha			
CAPITAL INPUT				
Stocks	3 886	2 726	3 194	2 749
Equipment	6 164	5 904	6 009	5 880
Buildings	22 121	20 766	21 312	20 540
Land incl. stocks in ground	29 785	25 116	26 995	27 481
Total	61 956	54 512	57 510	56 650

Accounts in the horticultural sector are treated in a different way, and will be discussed in chapter 6.

The description of how to convert the farm account data into a gross margin account at activity level (into the expanded data source) is the aim of this chapter. First, we look at the econometric model and afterwards how to estimate the key figures used by the model. Annex II contains a specified list with activities (enterprises) in which a farm might be engaged. Annex III contains a specification of variables in the expanded data source.

[2] Activity is used as a synonym for agricultural and horticultural enterprises. 'Enterprise' is used in Danish publications. In the SGM and FSS context the word 'Characteristics' is used to name crop and livestock activities.

[3] Unfortunately, the results are only stated in Danish, but an English version will be available in the near future.

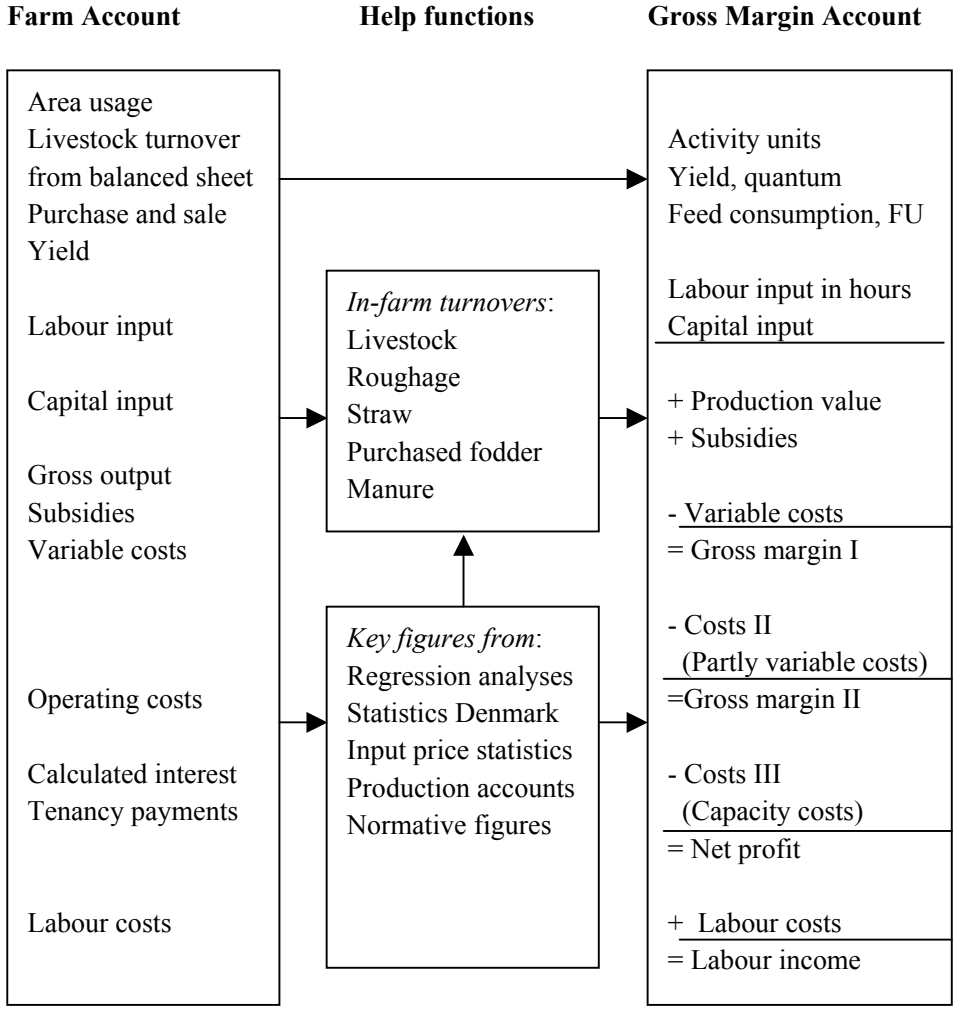
Table 2. Wheat, regions and the whole country, output and costs

	Islands	Jutland	Denmark 2001	Denmark 2000
	DKK per ha			
ACTIVITY OUTPUT				
Grain, for sale	5 625	4 081	4 703	4 540
Grain, in-farm fodder consumption	1 006	2 055	1 632	1 600
Straw, for sale	303	207	246	214
Straw, in-farm fodder and bedding	166	294	243	247
Compensation payment	2 412	2 413	2 412	2 262
General subsidies	51	56	54	52
Total	9 563	9 106	9 290	8 915
VARIABLE COSTS I				
Seeds	384	402	395	382
Fertilizers	751	651	692	540
Manure	305	578	469	346
Crop protection	652	644	647	649
Energy	288	298	294	304
Contract operations	515	577	552	522
Drying and stocking	6	11	9	5
Other costs	148	139	142	125
Calculated interest, stocks	155	109	128	110
Total costs I	3 206	3 409	3 327	2 984
Gross margin I	6 361	5 695	5 962	5 932
COSTS II				
Labour cost	2 258	2 097	2 162	2 084
Maintains, equipment	648	555	592	563
Depreciation, equipment	1 131	1 054	1 085	982
Calculated interest, equipment	247	236	240	235
Total costs II	4 284	3 942	4 080	3 865
Gross Margin II	2 073	1 755	1 883	2 066
COSTS III				
Taxes in general	480	382	422	327
Insurance	201	174	185	178
Miscellaneous costs	396	461	374	378
Maintains and depreciation, buildings	523	453	481	489
Maintains and depreciation, land improvm.	91	127	113	119
Calculated interest, buildings	868	829	845	817
Calculated interest, land	1 660	1 447	1 533	1 351
Total costs III	4 219	3 774	3 954	3 650
Total costs I+II+III	11 710	11 125	11 360	10 499
Operating profit	-2 145	-2 018	-2 070	-1 584
Labour income	113	79	92	500

4.1. The econometric model

The headlines of the econometric model are outlined in figure 1, and the detailed model is shown in annex IV.

Figure 1. Converting an annual farm account into Gross Margin Account



The condition for the model is the original farm account with earnings and costs. The model converts each original account into a gross margin account, where all inputs, gross outputs and costs are distributed to the different activities using key figures, area of different crops and number of livestock. The conversion also includes an assessment of the internal transfers of roughage, fodder cereal, by-products, livestock and manure. The internal transfers reflect farm economics among activities – in quan-

tity and value as well. Thus, the gross margin account expresses the total economy of each activity.

The outputs for most of the activities are recorded in the original accounts and can be converted directly. For wheat - for instance – exists total quantity of grain-harvest, sales value and value of internal transfer, and these data can be converted directly into the gross margin account concerning wheat. However, there is hardly any information in the accounts as to which activities the internal transfers have taken place. The model takes the distribution of input to the single activities into account, and how the costs are distributed among the different activities. A large number of items are allocated to the individual activities based on the size of the crop activity, and for livestock activities on standard figures for fodder consumption per unit etc. In most cases, the key figures are computed by a multiple linear regression analysis based on the accounts. Other sources are figures/information from the Danish Agricultural Advisory Centrer, Statistics Denmark and general price statistics. Moreover, figures from the farmers' 'Manual of Farm Management' have been used.

The key figures are primarily estimates from regression analyses. Results are evaluated, taking into consideration the displacement of the key figure from previous year and present production information from external sources. The key figures are updated in the light of a professional evaluation of the observed figures, - is the displacement of the figures reliable or out of fact? The targets are to ensure continuity over years and at the same time make sure that the statistics will reflect the reality.

For some variables the regression analyses show clearly effects according to size-of-scale or other important correlations. These effects have been included in the distribution computations. For instance, equipment costs in crop activities are correlated with the value of the earth (soil quality) and costs of contract operations. Also, the labour input depends on the amount of contract operations. See also chapter 4.3.1.

Roughage crops - in relation to sale crops - are handled differently as only cost, but no product value, net profit or labour income is calculated. Costs, factor-input and subsidies concerning roughage production are included in the activities where the roughage is consumed - primarily in cattle activities. Therefore, calculation of labour income in cattle activities includes labour input and costs in roughage production.

Next chapter gives an example on key figures for distributing the cost of chemical or plant protection on crop activities. Please note, it is the relations between the key figures, which are relevant rather than the exact level of costs.

The model defines 51 activities, see annex II. Some of the defined activities are not used for statistical dissemination, because of minimal importance for sector results. However, the activity must exist on the single farm to pick up the connected costs and input factors used in connection with the activity, or results for the other important activities would be disrupted. Therefore, the activity "Other activities" is defined in the model. "Other activities" is a collector of all input factors and costs, which cannot be placed to a relevant activity.

The model defines 250 variables per activity, see annex III. Not all variables are used in each activity. The model uses a matrix of 86 columns and 250 rows for each account. The first coordinate represents the number of the activity and the second coordinate represents the number of variables. Not all cells are used.

The model is linked to a test system giving attention to model results, which are not professionally correct and which differ with the reality. The operator is able to correct/adjust each account on the basis of test alerts. After correction of an account has been made, the model program ensures that the correction is still consistent with the original account.

In short, the model results for each activity are:

Technical data
Capital input
Product value incl. direct subsidies
- Costs I (variable costs)
= Gross margin I
- Costs II (partly variable costs)
= Gross margin II
- Costs III (capacity costs)
= Net profit
+ Labour costs
= Labour income

4.1.1. Conditions for internal transfers of livestock and feeding stuff

As mentioned earlier, most outputs and subsidies are recorded in the account. Quantity and values of purchased and sold products into and from the farm are recorded. Real changes in the value of stocks are included in the gross output and can be allocated directly to the activities. Moreover, the model has to take internal transfers from one activity to another into account. Lack of information has to be compensated by assumptions about normal prices for livestock, roughage, concentrates etc.

Livestock. Values of internal transfers of livestock between the activities "Dairy cows" or "Nurse cows" and "Breeding Cattle" or "Slaughter Calves" and also between the activities "Sows and piglets" and "Slaughter pigs" are calculated from external information about prices per head. The prices used in the year 2001 are shown in table 3.

Table 3. Internal prices for livestock, DKK per head

Jersey, heifers-in-calf	4 100
Other breeding, heifers-in-calf	6 300
Jersey, new-born calves	300
Other breeding, new-born calves	800
Gilts	1 050
Piglets (28 kg)	460

Roughage yields (no valuation). The account does not include information about the yields of roughage harvest. Therefore, the quantities are assessed using information about harvest by regions from Statistics Denmark. An assessed loss is deducted from the yields, and afterwards the yields in table 4 reflect the needs of feed units (FU) to be consumed by the livestock. On organic farms the estimates are 20 pct. lower. Furthermore, the amount of feed units transferred to livestock is reduced by the quantities sold, which are assessed using a price of DKK 1,00 per feed unit. Average roughage yields in the year 2001 are shown in table 4.

Table 4. Roughage yields in FU per ha [1)]

Fodder beets including tops	13 700
Grassland in rotation	7 400
Permanent grassland	3 500
Maize, silage	8 900
Cereals, silage	5 700
Late crop, secondary crop	1 400

1) Average yields on conventional farms for the whole country

Straw and other by-products. The quantity of straw used as fodder and bedding has been assessed on the basis of standard needs for straw in livestock activities. This calculation includes purchased as well as homegrown straw. Afterwards, the internal transfers are calculated, taking into account the maximum quantity, which can be produced on areas with cereals.

The use of *sugar beet tops and straw from grass for seeds* is assessed, taking into consideration the maximum consumption by livestock. The value of home-grown straw and by-products is assessed at DKK 1,00 per feed unit.

Home-grown cereals and potatoes as feeding stuff and seeds for sowing. The value of home-grown cereals, peas and potatoes used on the farm is recorded in the accounts. This information is used in the conversion to FU in accordance with prices in table 5.

Calculation of feed units in purchased feeding stuffs. The calculation of the feed units is based on recorded total values, and the calculation takes into account that the consumption of concentrates varies between activities. Table 5 shows prices used in the accounts for 2001. The price of concentrates has been reduced by a discount of up to 6 pct, depending on the purchased quantity.

Table 5. Fodder prices for conversion from value to feed units [1)]

	DKK per 100 FU
PURCHASED FODDER	
Cereals and concentrates for:	
- Dairy cows	149
- Nurse cows	146
- Rearing cattle	270
- Slaughter calves	153
- Sows incl. Piglets (7 kg)	131
- Piglets (7-28 kg)	173
- Slaughter pigs	130
- Hens	146
- Broilers	133
- Sheep	114
- Furred animals	181
- Other livestock	150
Molasses, pulp etc.	110
Roughage	100
HOME-GROWN, CEREALS ETC	
Barley	85
Wheat	85
Peas	100
Potatoes	25

1) Average prices of conventional fodder

A varying content of especially high percentage (high nutritive content) feeding stuffs implies that there are differences in the price of cereals and concentrates. The price of concentrates for rearing cattle is high due to a large share of whole milk substitute and mineral/vitamin in the concentrates.

Manure. The value of manure depends on the livestock species and the amount of feeding stuff. The price is estimated according to the corresponding amounts of fertilizers. If the amount of manure per hectare exceeds the standards in the environmental legislation, the surplus amount is not valued. The surplus has to be removed from the farm by agreements with neighbouring farms. This limitation is especially important for farms with a large number of pigs and a small area for cropping.

4.2. Results of regression analyses when distributing input factors and costs

Values of input factors and cost in the original farm account are not distributed to single activities. The distribution is determined according to 1) results from regression analyses based on the original farm accounts or 2) guidelines in gross margin estimates from The Danish Agricultural Advisory Centre. The analyses are based on 1.928 accounts from the agriculture sector, where 1.639 are engaged in conventional farming and 289 in organic farming. Results from the regression analysis are considered the most appropriate method in describing the correspondences between size of activities and the amount of input factors and costs. A more detailed description of the regression analysis-model and the upcoming results are given below. The multiple linear regression-analysis models with k independent variables are given by the formula:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + \mu_i \qquad i = 1, \ldots\ldots, n$$

Where:

Y_i = Dependent variable (response variable)
X_{ki} = Independent variables (input data)
k = Number of independent variables
β_k = Parameter estimates
μ_i = Residual
n = Number of observations

Assumptions:

$$E(\mu_i) = 0, \qquad i = 1,\ldots,n$$
$$Cov(\mu_i,\mu_j) = 0, \qquad i \neq j$$
$$Cov(\mu_i,\mu_j) = \sigma^2, \qquad i = j$$
$$\mu_i \sim N(0,\sigma^2)$$

The response variables are the various input factors and costs. The independent variables contain the size of various activities (area or livestock). In some cases, the independent variable can also be a dummy (help variable), where it is significantly determined, and it provides the single model with better statistical explanation strength. For some estimates the intercept is eliminated.

Parameter estimates (key figures) are calculated for the following input factors and costs; the number before the text refers to the variable number in annex III:

9 Labour input in hours.
13 Equipment, value.
14 Buildings, value.
16 Value of land stock.
101 Seeds for sowing.
102 Fertilizers.
104 Manure from own livestock.
105 Plant protection.
106 Fuel.
107 Electricity and miscellaneous energy.
109 Contract operations I (harvesting and straw pickup).
110 Contract operations II (other operations than harvesting and straw pickup).
111 Drying and storage rental.
112 Miscellaneous cost related to cropping.
120 Fodder cereals and concentrates.
127 Insemination.
128 Veterinary service and medicine.
130 Control association costs.
131 Miscellaneous costs related to animal production.
142 Maintenance, equipment.
143 Depreciation, equipment.
156 Insurances.
157 Car costs.
158 Miscellaneous costs.
159 Maintenance, buildings.
160 Depreciation, buildings.

4.3. Use of results from regressions-analysis

Tables 6 and 7 contain the results when analysing costs of plant protection as the dependent variable (*Y*). The calculated parameter values are estimates for plant protection costs per ha with different activities. R^2 is an expression, which indicates the degree of explanation from the model with a maximum of 1,0. The calculation example in table 6 has $R^2 = 0{,}90$. It might be an advantage to link activities together in a way where each estimated parameter thus attains a t-value over 2. Linking activities together occurs under conditions of multi-collinearity between the affected activities.

Table 6. Estimated parameters for costs of plant protection

Activity	Estimated parameter (ßi)	t-value
Spring barley	341	22
Winter barley	502	11
Wheat	656	40
Ray	402	8
Oats	341	22
Pulses	702	6
Potatoes	1 889	21
Sugar beets	1 614	19
Seeds for sowing	552	8
Rape	671	10
Fodder beets	1 859	10
Grassland in rotation	68	2
Silage maize	545	13
Silage cereals	249	17
More activities	-	-

Intercept is eliminated from the model for plant protection. $R^2 = 0{,}90$

The results from the regression analysis and information from external sources form the basis for the final decision about the sizes of key figures. Further, a reliable trend over the years is ensured. Afterwards, the key figures are used in distributing input factors and costs to the actual activities at each single farm. The relation between the real value (one entry in the farm account) and the sum of calculated values (according to key figures multiplied by activity units) is used to regulate relatively the distributed values. It ensures that the sum of distributed values is equal to the real value in the farm account. An example of plant protection costs is shown in table 7.

Table 7. Distributing of plant protection costs, DKK 33.500 among activities

Activities	Ha	Key figures per ha, DKK	Calculated total cost, DKK	Relation [1)]	Distribute total costs, DKK
Spring barley	20	341	6 820	0,91325	6 228
Wheat	12	656	7 872	0,91325	7 189
Pulses	4	702	2 808	0,91325	2 565
Fodder beets	6	1 859	11 154	0,91325	10 186
Grassland in rotation	10	68	680	0,91325	621
Silage maize	8	545	4 360	0,91325	3 982
Silage cereals	12	249	2 988	0,91325	2 729
Farm total	72	-	36 682	-	33 500

[1)] Value to distribute 33.500. Relation = 33.500 / 36.682 = 0,91325, calculated as real costs divided by calculated costs

Please note that distributed values at each farm relate to the activity level. Later on in the statistical process values per unit are calculated in statistical and tabulating programs.

Evaluating results from regression analysis. In estimating key figures, it is characteristic that the best estimates are found for groups of costs, where a direct dependency on the extent of production extent is observed. For instance, in analysing costs of concentrates, seeds and plant protection, there is a R^2 value of about 0,9 resulting in steady regression parameters and further steady key figures. On the other hand, costs of cars and insurance regression parameters seem unreliable, delay of satisfactory explanations as well as number of significant parameters are very low. Therefore, in these cases key figures are also based on external knowledge and experience about structure in costs.

Principally the most satisfactory estimates concern activities, where many observations exist with values, which are not zero. It concerns activities with cereals and linked activities, dairy cows (and linked activities), breading sows and pigs for slaughtering.

4.3.1. Conditions with correlation between independent variables

Significant parameters have been estimated for all input factors and costs concerning important activities, while for less important activities considerable fewer significant results have been observed. It is mainly regarded for long-term capacity costs, which are due to multi-colliniarity[4] and/or too few observations. The first assertion is about

[4] Co-variance between two or more independent variables.

dairy cows, heifers, calves for slaughtering and fodder crops, and the second assertion is about activities as clover seeds, broilers, horses, sheep etc.

Based on the mentioned co-variance a number of activities are linked together and appear as one activity in the regression analysis. Determination of linking-factors is based on information about needs of buildings, equipment, labour, energy etc. If no information exists a rough estimate is applied as the linking-factor. A frequently used linking of activities is units of dairy cows, which are linked together with units from nurse cows, heifers, calves for slaughtering and in some cases also with roughage. A cereal unit is another frequently used link with linking of cereals, pulses, rape and equal crops.

Heteroskedasticity. The influences based on heteroskedasticity[5)] are handled by a method called 'weighted least squares'. The procedure makes it possible to weight extreme observations so they achieve less weight according to the formula $w_i = 1/\sigma_i^2$, that is a weighting factor proportional to $1/\sigma_i^2$ in group number *i (*group number is from a further breakdown of the original observations). The aim is to equal approximately the error variances in each group. The choice of weighting factor is SGM corrected with values from activities, which are not defined in the SGM-context, such as income from contract-work, small forests, other animals and other sources. Meanwhile, only the SGM from relevant activities are used in estimates for some specific costs concerning activities with crops and livestock.

In the first step a regression analysis is compiled with all observations to have an estimate of w_i. In the second step the observations are spilt up in four groups sorted by ascending order of SGM, and the error variances are compiled for each size group. In the next step coherence has to be estimated between average SGM-size and error variance for each size group and further between the size groups.

Size group	I	II	III	IV
Average SGM	sgm1	sgm2	sgm3	sgm4
Error variance	σ_1^2	σ_2^2	σ_3^2	σ_4^2

[5] The error variance is unequal for different groups of observations so the assumptions – noted first in the chapter – fail. In this type of analysis we typically observe an increasing variance with increasing farm size.

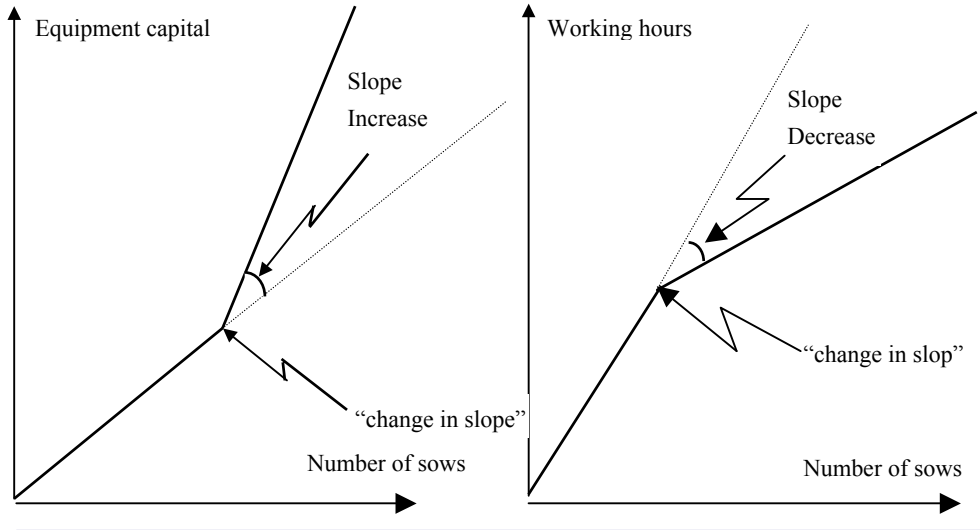
Proportional coherence between SGM and error variance are expressed as follows:

$$(\text{sgm4}/\text{sgm1})^{x} = (\sigma_4^2 / \sigma_1^2) <=> x = 1n((\sigma_4^2 / \sigma_1^2)) / 1n(sgm4 / sgm1)$$

Hereafter $w = 1/ sgm^x$ has been choosen as weighting factor. The calculated values of x are typically in the interval 1 – 1,5.

Dummy variables. Dummy variable are used in connections where parameter estimates are influenced by size of activity, by type of farm, by soil quality or by hired contract work. In particular, dummies are used for modelling linear estimates (straight functions) into a piece-by-piece linear function with different slopes, a spline function. The result looks like a curved continual function; see figure 2.

Figure 2. Spline function for equipment capital and working hours



For instance, significant positive slope increases are observed over the point "change in slope" for activities with units of dairy cows and sows when estimating parameters for input of equipment capital. It means increasing equipment capital per animal by increasing herd size - in other words - the degree of mechanization rises when herd size increases. On the other hand, significant negative slope decreases are observed over the point "change in slope" for most activities when estimating parameter for

working hours. It means decreasing working hours per activity unit by increasing activity size.

Another dummy variable is used in connection with variation in soil quality. It is used under the assumption that some costs (for equipment and buildings) concerning crop activities are increasing concurrently with better soil quality. As a rule, better soil quality results in increasing crop yields and demands of more power in the soil cultivation. The average soil value per ha is used as an estimate of soil quality. It is calculated for the region and the single farm as well. The difference between these two figures is multiplied by SGM from crop activities; see the following formula:

$$B_i = SGMP_i\left(\frac{G_i}{A_i} - \overline{G}\right) \qquad i = 1, \ldots\ldots, n$$

Where:

B_i = Soil quality factor
$SGMP_i$ = SGM from crop activities
G_i = Value of agricultural area on the holding
A_i = Agricultural area on the holding
$\overline{G}$ = Region average value of 1 ha agricultural area
n = Number of observations

The analysis has indicated significant coherencies, and afterwards costs of equipment and buildings have been altered, where earth-value on the holding differs from average. Meanwhile, an alteration-limit is set (maximum +/- 25 pct.) as to how much the estimates for crop activities are allowed to arise or go down on holdings with high or low soil values respectively.

Furthermore, the analysis has indicated that use of hired contract-work influences the distribution of working hours, costs of equipment maintain and fuel costs. This happens because hired contract-work in principal concerns crop activities, and the distribution of 'saved costs' differs from results with the general estimated parameters. The relation between the parameters has changed, and it is taken into consideration when distributing working hours and mentioned costs. An example is given in table 8.

The assumptions with respect to the calculation are that the holding has costs of equipment maintain, DKK 7.400. In the situation with no hired contract-work (col-

umn 2) the equipment maintain costs are distributed to 10 ha spring barley and 10 dairy cows according to general key figures, DKK 3.650 DKK and DKK 3.750 DKK respectively.

Table 8. Distribution of equipment maintain costs, with or without hired contract-work, DKK

	No hired contract-work	With hired contract-work			
	Equipment maintain	Costs of contract-work	Saved costs of equipment maintain	Altered costs of equipment maintain	Unchanged total costs of equipment maintain
10 ha spring barley	3 650	13 430	1 209	2 441	2 986
10 dairy cows	3 750	1 570	141	3 609	4 414
Total	7 400	15 000	1 350	6 050	7 400

In the situation where the holding has costs of hired contract-work – for instance DKK 15.000 - the first distribution has to be altered. The assumption is that the saved costs on equipment maintain are equal to the costs which the holding itself would have had if contract-work had been carried out for other farmers. Analysis of this activity results in equipment maintain costs of DKK 90 for each earning of DKK 1.000 by contract-work for others. It means that costs of DKK 13.430 for hired contract-work concerning 10 ha spring barley (table 8 column 3) have consequently resulted in saved costs of DKK 1.209 (table 8 column 4) for equipment maintains (13.430/1.000 x 90). Now the altered cost for spring barley and dairy cows are DKK 2.441 and DKK 3.609 respectively. The calculation for spring barley is (3.650 – 1.209) = DKK 2.441. However, the total costs have to remain unchanged DKK 7.400, therefore the two specified values in column 5 are regulated proportionally with factor 1,22 (DKK 7.400/DKK 6.050). The total values in columns 2 and 6 are equal, but the relation between the distributed values has changed.

Vacant building capacity. Estimation of key figures for distributing cost of building maintains has been influenced by unused buildings on many farms specialized in crop production. Consequently, it resulted in high and unbelievable estimates for building input to crop activities. To eliminate this effect the estimation has been limited to observation, with main emphasis on cattle and pig production.

5. Form with the SGM calculation

The gross margin for each crop and livestock activity is calculated according to the rules laid down in Commission Decision 85/377/EEC and later amendments. Most of the SGM calculations are quite simple. Many figures are just transferred from the expanded data source form to the layout for the SGMs. The referred data source is the statistical results from the expanding model discussed in chapter 4. Figures in table 2 and table 9 are almost equal. However, table 9 focuses on SGM-relevant items, where some items from table 2 are added together.

In the SGM context, there are two regions in Denmark: The Islands and Jutland. Differences in SGM from important crops are recognized between the two regions, but for other less important crops and all livestock activities SGMs are set equal for the two regions.

In the future - if the SGM system has to be revised - it may become realistic to have only one SGM applied for the whole country for crops, too, because there are as much deviations from the standard within each region as there are between regions.

Tables 9 and 10 show the general SGM forms for agricultural crops and livestock. Results from the last 6 years are included. Annex V contains tables for some important SGM activities with results from the latest 15 years. A spreadsheet with all activities is on homepage http://www.foi.dk/data/Baggrundspapirer/SGM2000.xls.

It is a spreadsheet layout, where one data page contains all relevant statistical results from the expanding model. Figures in column 3 - also the latest year 2001 – refer to results in the expanded data source. The spreadsheet is updated every year with new statistical results, and SGM results from previous years are set one column backwards, making free space for new SGMs in column 3. In the Danish farm classification the SGMs are changed every year in order to reflect the latest structural development.

Table 9. Form with SGM calculation for wheat at the Islands

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per ha							
Compensatory payment	2 289	2 419	2 283	2 164	2 200	2 137	2 165
Quantity, hkg	80,27	81,00	81,30	78,50	77,70	75,60	73,40
Price per hkg, DKK	81,03	81,89	81,29	79,86	77,34	88,17	92,86
Value per ha , DKK	6 504	6 633	6 609	6 269	6 009	6 666	6 816
Byproduct- straw, DKK	441	469	433	421	388	366	359
Total, DKK per ha	**9 233**	**9 521**	**9 325**	**8 854**	**8 597**	**9 169**	**9 340**
Specific costs per ha							
Seeds, DKK	381	384	378	382	401	421	400
Fertilizers, DKK	650	754	581	616	705	733	752
Crop protection, DKK	679	652	660	725	639	547	539
Miscellaneous, DKK	116	138	101	109	118	80	80
Total, DKK per ha	**1 827**	**1 928**	**1 720**	**1 832**	**1 863**	**1 781**	**1 771**
SGM, DKK per ha	7 407	7 593	7 605	7 022	6 734	7 388	7 569
Predicted values		7 492	7 476	7 460	7 444	7 429	7 413
Intercept	7 254,11						
X-coefficient	15,86						
Estimat SGM2000, DKK	**7 476**						

The set up with 15-year results opens up for the possibility to calculate trends over years. Column 2 has a 3-year-average, which up to now has been the EU rule in SGM calculation. The intention of using a 3-year average is to avoid the economic results from one year to influence the SGM in an undesirable manner. The gross margin for a single year is affected by the weather and by exceptional prices of products etc. The experiences in Denmark are that even when using the 3-year average, there are consequences in the form of undesirable and unacceptable fluctuations in the SGMs.

Therefore, Denmark has improved the calculation of the SGMs and the results still represent the year in the middle of the three-year period in question. In the improved method of estimating SGM, the gross margins from the latest 15 years are used as observation in a linear regression analysis. The parameter estimates (Intercept and X-coefficient) and the predicted values (Estimate SGM2000) are shown at the bottom of table 9 and table 10; see also the publication 'Calculation SGM – How we do it in Denmark' http://www.foi.dk/wp/wp200006.pdf.

For crop activities, further specifications of costs are not available. Meanwhile, for livestock activities costs can be broken down, example for dairy cows in table 11.

Table 10. Form with SGM calculation for dairy cows

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per cow							
Increase of meat							
Quantity, heads	0,40	0,37	0,42	0,40	0,41	0,42	0,43
Price per head, DKK	3 119	2 820	3 299	3 208	3 350	3 412	3 415
Value, DKK	1 246	1 049	1 392	1 296	1 360	1 433	1 472
Other main product, milk							
Quantity, kg	7 334	7 403	7 296	7 304	7 111	6 964	6 761
DKK pr kg	2,38	2,47	2,36	2,31	2,40	2,38	2,37
Value, DKK	17 460	18 268	17 230	16 883	17 065	16 591	16 045
Byproduct, new born calves							
Quantity, heads	1,02	1,01	1,03	1,01	1,02	1,05	1,07
Price per head, DKK	757	682	795	793	822	714	678
Value, DKK	771	687	822	803	838	749	728
Compensatory payment	68	135	70	0	0	35	48
Total, DKK per cow	**19 545**	**20 139**	**19 514**	**18 982**	**19 263**	**18 808**	**18 293**
Specific costs per cow							
Replacement							
Quantity, heads	0,40	0,37	0,42	0,40	0,41	0,42	0,43
Price per head, DKK	5 974	5 965	5 934	6 025	6 165	5 869	6 009
Value, DKK	2 386	2 219	2 504	2 434	2 503	2 465	2 590
Variable costs							
Concentrate feed stuffs, DKK	3 118	3 432	2 999	2 924	3 063	3 197	3 158
Coarse fodder, DKK	798	820	770	805	852	834	884
Miscellaneous, DKK	1 034	1 106	1 002	995	929	912	840
Total, DKK per cow	**7 337**	**7 577**	**7 275**	**7 158**	**7 347**	**7 408**	**7 472**
SGM, DKK per cow	**12 208**	**12 562**	**12 239**	**11 824**	**11 916**	**11 400**	**10 821**
Predicted values		12 107	11 980	11 853	11 726	11 599	11 472
Intercept	10 202,28						
X-coefficient	126,96						
Estimate SGM2000, DKK	**11 980**						
SGM per cow, - with purchased coarse fodder, DKK	8 665	9 063	8 696	8 237	8 520	8 142	7 755

To compile SGM for dairy cows, where all roughage is purchased, the value for home-grown roughage (rows 3 to 11 in table 11) is altered to reflect an imaginary value of market prices – 0,95 DKK per FU. For dairy cows: (3.268 FU * 0,95 – (646-483)) = 2.942 DKK.

Table 11. Breakdown of specific costs for dairy cows, 2001

	Variable number in annex III			Value, DKK
Concentrate feed stuffs	120			3 432
Purchased roughage	122+123+124+125			657
Home grown roughage (specific cost):		FU per cow	DKK per FU	646
Fodder beets	63	204	0,26	
Grassland in rotation	64	1 158	0,11	
Permanent grassland	65	354	0,10	
Silage maize	66	677	0,27	
Silage cereals	67	709	0,29	
Silage pulses	68	40	0,33	
Secondary fodder crops	69	126	0,22	
Total		3 268	0,20	
Area subsidies, fodder crops	86			-483
Insemination	127			210
Veterinary services and medicine	128			449
Control association	130			164
Miscellaneous cost	131			283

5.1. Differences, SGM activities versus expanded data source

The activities wheat and dairy cows are easy examples, because definitions of units (ha and one dairy cow per year) are equal in the SGM context and in the expanded data source. However, some activities in the expanded data source have to be added up and some have to be broken down. In annex II column 1 it is indicated which activities to add up and which to break down. Example of adding up: SGM for barley, D/04 (the activity code in SGM context) consists of both winter barley and spring barley. In adding results together one has to take into account how much each activity should weigh.

5.2. Specification of SGM for cattle

The expanded data source has results for rearing cattle as one activity and cattle for fattening as another activity. In the SGM context, each category is broken down into three age groups. This is an arbitrary breakdown, because there exist no available data about market prices for these animals at the age of one and two years, respectively. Market prices are normally observed, when cattle are brought to market for slaughter or for further breeding. The age of the animals is - at that time - often more or less than one exact year. In a model, results per holding must be broken down into three age groups and afterwards into per head, see table 12.

Table 12. Breakdown in age groups of per farm results for cattle

	Female rearing cattle				Male cattle			
	Under 1 year	1 - 2 years	Over 2 years	Total	Under 1 year	1 - 2 years	Over 2 years	Total
OUTPUT:								
Annual heads per farm	7,75	7,00	2,51	17,25	6,33	1,69	0,23	8,26
SALES AND TRANSFERS:								
Number of heads	9,60	8,16	5,06	22,82	7,84	6,60	0,10	14,54
Value per head, DKK	2 578	4 604	6 711		3 190	5 447	7 592	
Total value per farm, DKK	19 974	32 221	16 829	69 023	20 202	9 212	1 751	31 165
PURCHASE:								
Number of heads	9,60	8,16	5,06	22,82	7,84	6,60	0,10	14,54
Value per head, DKK	682	2 578	4 604		682	3 190	5 447	
Total value per farm, DKK	5 281	18 042	11 545	34 867	4 317	5 394	1 256	10 967
VARIABLE COSTS:								
Concentrate feed stuffs, DKK	12 125	3 866	1 385	17 376	13 428	2 805	336	16 568
Roughage, DKK	1 810	4 184	1 690	7 684	943	503	78	1 524
Miscellaneous, DKK	1 015	3 068	1 099	5 182	796	213	29	1 038
Total per farm, DKK	20 230	29 159	15 719	65 109	19 484	8 915	1 699	30 097
Gross margin per head, DKK	**-33**	**437**	**442**		**113**	**176**	**227**	
Purchase of all roughage, DKK	4 601	8 446	3 362	16 409	2 073	1 052	161	3 286
Gross margin per head with purchased fodder, DKK	-393	-171	-225		-65	-148	-135	
Roughage compensatory payment, DKK	991	956	356	2 303	94	22	3	119
Direct compensatory payment, DKK	82	79	29	191	9 376	2 253	292	11 921
KEY FIGURES:								
Concentrate, feed units per head per year	170	60	60		1 093	855	750	
Roughage, feed units per head per year	930	1 890	2 100		842	1 600	1 800	
Growth, gram per day	585	625	650		1 111	1 000	950	

Results per holding for female as well as male cattle are given in columns *total*, - results from the expanded data source. In both categories facts exist about values for new-born calves and at the end for breeding cattle and cattle for slaughtering. Number of heads sold from each age group is calculated based on macroeconomic data from slaughterhouses and markets. Please note that for females over two years, the holdings have 2,51 stabled animals over the year, but 5,06 heads are sold during the year at an average age of about 2,5 years. Internal values between age groups are fixed according to normal growth rates in the age groups, - see bottom row of table 12. Equal value per kg meat increased in lifetime has been provided.

Equally, costs are distributed to age groups according to normal assumptions about growth and fodder consumptions. Figures (per head per year) for concentrated feedstuff and roughage are given in table 12, bottom rows two and three.

Figures from table 12 are transferred to the normal SGM form with a specification per head. The method ensures that are all output and costs remain at the holding in right quantities – nothing is missing. The breakdown into age groups might be slightly arbitrary and uncertain. However, in the typology the groups are often added up again, and the uncertainty does not disturb the classification. If the typology system has to be revised in the near future, it might be a good idea to use the same SGM for all three age groups, instead of calculating arbitrary SGMs.

5.3. Specification of SGM for pigs

SGM for 'Breeding sows' (J/12) includes piglets up to 20 kg, and SGM for 'Other pigs' (J/13) includes pigs for fattening from 20 kg up to slaughter weight. The limit for piglets at 20 kg is very difficult to handle, because in normal agricultural practice, piglets are normally taken from the sows when they have a weight of about 7 kg, and then moved to the fattening stable at 28 kg. This reality is reflected in the expanded data source, where results exist for 1) annual heads of breeding sows with piglets up to 7 kg, 2) piglets 7–28 kg, with results per pig 3) and pigs for fattening, with results per pig.

The results for piglets 7–28 kg are broken down into two weight groups to fulfil the SGM context. Results for piglets 7-20 kg are transferred to breeding sows, and results for piglets 20-28 kg are transferred to other pigs. SGM results for other pigs must be per head per year, which means 3,23 pigs per year. The breakdown takes into consideration that price for pig meat and costs might be somewhat higher per kilo for young piglets than for older piglets. SGM for 'Piglets (J/11) is set as SGM for 'Other pigs'.

5.4. Specification of SGM for other poultry

SGM for 'Other poultry' (J/16) is difficult to calculate. It is a very heterogeneous activity with ducks, geese, small turkeys and big turkeys. Unfortunately, the collected accounts do not contain valid data about this activity. However, output per head can be calculated, based on macro statistics about slaughtered poultry. Specific costs per head for other poultry are estimated relative to costs for broilers. Fixed relations between other poultry and broilers for each row concerning costs have been set years ago, and are still used.

5.5. Specification of SGM equidae

SGM for 'Equidae' (J/01) in Denmark concerns horses. Horses are mostly kept for breeding and hobby purposes. Output is based on macro statistics about slaughtered and exported horses. An output for use in hobbies (riding) is calculated, or SGM might prove to be negative. Calculation of costs is based on data from accounts, where veterinary costs can be extremely high.

6. SGM for horticultural activities

Descriptions up to now have mainly been about agricultural activities where SGM calculations are based on the expanded data source (see chapter 4). These data contains only few data about horticultural activities.

This chapter is about horticultural activities. The form with SGM has been altered in the upper part about output. Each horticultural activity includes many different crops (example: tomatoes, salad, peppers, etc.) and figures about quantity per ha would be meaningless. Instead, details about output reflect results per holding for the specific type of farm.

SGM for horticultural activities are calculated in a different way than agricultural activities, but still based on account results. The Horticulture Account Statistics contain results per farm for types of farming, where close to 100 pct of the production concerns a specific kind of crop. Example: for the type of farming *Vegetables in greenhouse* 99 pct of the output is from vegetables. The total value of output and specific costs are reduced by values related to the secondary crops, and the remaining output and specific costs per farm are converted to results per ha.

The composition of vegetables included is not decided when the SGM is calculated. It is assumed that the selected accounts have the right composition. However, it is true that 'Vegetables in greenhouse' (D/15) consists of too many tomatoes and too little salad. In a similar way, 'Orchard' (G/01) consists of too many apples and not enough cherries. These small problems have to be resolved in the selection of accounts.

The calculation method for 'Nurseries' (G/05) is shown in tables 13 and 14. The calculations are based on results from 35 accounts. SGM for other horticultural activities are calculated likewise.

The form in table 13 with output specification has been altered to reflect that input data is results per holding, total ha and value for the nurseries, and afterwards the value per ha is compiled. The aim of the row '… estimated adjustment' of area is to fine-tune the result according to previous statistical results at farm level.

Table 13. SGM calculation for nursery

	3 year average	2001	2000	1999	1998	1997
Gross output per farm						
Ha pr farm						
Nursery	11,69	12,6382	11,7284	10,7119	11,2869	10,8600
estimated adjustment	-0,22	-0,15	-0,23	-0,27	-0,02	-0,35
Gross output per farm						
Nursery, DKK	2 426 015	2 631 037	2 460 876	2 186 131	2 091 794	1 959 794
Total per ha, DKK	**211 396**	**210 682**	**214 019**	**209 361**	**185 675**	**186 469**
Specific costs per ha						
Seeds, DKK	35 034	36 657	35 348	33 095	34 072	28 906
Fertilizers, DKK	6 720	6 191	7 017	6 953	5 926	6 965
Crop protection, DKK	2 271	2 265	2 370	2 178	2 118	2 492
Miscellaneous, DKK	12 043	13 778	11 780	10 573	11 883	11 462
Total, DKK per ha	**56 068**	**58 890**	**56 516**	**52 798**	**54 000**	**49 825**
SGM, DKK per ha	**155 328**	**151 792**	**157 503**	**156 563**	**131 675**	**136 644**
Predicted values		141 744	138 640	135 536	132 432	129 328
Intercept	95 185					
X-coefficient	3 103,95					
Estimated SGM2000, DKK	**138 640**					

Costs calculations for nurseries are found in table 14. Again, the calculation starts with results per farm in column 2, where type of farming is 'Nursery'. Costs concerning secondary crops are shown in columns 3 to 9. Finally, in column 10, we have the 'cleaned' results for the nursery activity, where costs of the secondary crops have been deducted from the results in column 2. Figures in column 10 are divided by area (12,66 ha) and copied to table 13, column 2001.

The deducted costs for secondary crops are based on averages. Natural deviations in costs, which doubtless occur on small crop areas, are suppressed.

Table 14. Cost calculation for nursery, 2001

1	2 Nursery as type of farm	3 Barley	4 Rape	5 Set aside	6 Vegetables in open area	7 Flowers in open area	8 Fruits	9 Grass	10 'Cleaned' Nursery
Ha	17,27	3,26	0,12	0,52	0,22	0,25	0,06	0,18	12,66
Seeds, DDK	481 363	1 445	40	42	1 624	14 199	5	7	464 004
Fertilizers, DKK	87 692	2 249	100	0	315	6 564	58	47	78 417
Crop protection, DKK	31 538	1 185	65	0	349	1 086	187	1	28 852
Miscellaneous, DDK	181 272	449	15	13	2 447	3 860	84	6	174 482

Further specifications of costs for horticultural crops:

- *Seeds*: seeds, bulbs, cuttings, licences to grow plants etc.
- *Fertilizers:* fertilizers, growth media, carbon dioxide, water supply
- *Crop protection:* chemicals, biological control
- *Miscellaneous:* pots and containers, transport, packing, miscellaneous and energy for heating and lighting the crops

6.1. Specification of SGM for flowers in open area

SGM for flowers in open area (D/16) is very difficult to calculate. Results fluctuate from year to year. It has to be carefully ensured that the trend over years is reliable. There are good reasons why results fluctuate. The growth period often covers several seasons, where one season has a lot of costs and no output, and next season it is all upside down.

7. SGM for crops of minimal importance

SGM for some crops of minimal importance, no separate calculations have taken place. SGM are copied from other crops:

1. D/06 Grain maize is set as SGM for barley
2. D/21 Fallow land without any subsidies is set as '1'
3. F/02 Rough grazing is set as SGM for pasture and meadows
4. G/06 Other permanent crops are set as SGM for fruit and berry plantations
5. G/07 Permanent crops under glass are set as SGM for vegetables under glass

8. Fodder balance coefficients

When the SGMs are used to calculate the total SGM for a single farm, it is assumed that the SGMs from the areas with roughage are zero and the variable costs of fodder production are deducted when calculating the SGM of grazing livestock. This is the normal balance situation. However on some farms there are situations with surplus or deficit of roughage production. The Commission Decision 85/377/EEC describes rules to handle this unbalance between the areas with roughage and the number of grazing livestock. The relation R = (SGM from grazing livestock / SGM from roughage) is estimated. If this coefficient is greater than or less than two threshold values it is an unbalanced situation.

In Denmark the thresholds are estimated in the following manner: Based on accounts from the three-year period in question, the total SGM from grazing livestock and the total SGM from areas with roughage are calculated. The relation R_a between the SGMs is assumed as an average situation. The calculation is based on "SGM2000" and data from 1999, 2000 and 2001.

Table 15. Coefficients for roughage deficit and surplus, SGM2000

SGM from livestock, mio. DKK.	26 510
SGM from areas with roughage, mio. DKK.	9 744
R_a coefficient, average situation	2,72
R_d coefficient, roughage deficit	5,4
R_s coefficient, roughage surplus	1,4

The threshold R_d = (roughage deficit) is set as the double of the average situation and the threshold R_s = (roughage surplus) is set as the half of the average. The method is quite simple, but seems to function very well. The coefficients when calculating "SGM2000" are shown in table 15.

9. SGM calculation control

After SGM calculation for each activity, a test-program is run to ensure the validity of the SGMs. The SGM coefficients are multiplied by the activity units (ha with crops and number of livestock) from each farm account, and the total farm SGMs are summarized to homogeneous groups, defined as type of farming and the size group. For the same groups it is possible to calculate and summarize the actual gross margin at farm level. The results from the two calculation methods are compared. If the comparison does not work, it is important to go back and have a look at the original SGM

calculation. In some cases there is a natural explanation for the difference. For instance, value of straw from cereal crops - for in-farm use - is included in the SGM output, but the straw is not valuated in the original farm account. Therefore, the calculated SGMs might be higher than the gross margin on farms that have specialized in cropping.

Table 16. Comparison of calculated SGM with gross margin 2001, per thousand [1)]

Type of farming	0-15 ESU	16-25 ESU	26-39 ESU	40-59 ESU	60-99 ESU	100-139 ESU	140-249 ESU	250-499 ESU	>=500 ESU	Total
CROPPING										
Cereals, rape, seed, protein crop, set aside	1 246	1 215	1 060	1 087	917	929	1 010	928	906	1 048
Mixed cropping	1 297	1 158	1 156	986	1 036	916	946	932	1 086	1 001
CATTLE										
Cattle	1 450	1 191	1 282	1 075	1 015	944	941	910	1 066	969
Cattle and mixed farming	1 307	0	1 460	0	1 303	1 309	980	1 039	0	1 080
Cattle and cropping	1 253	1 515	1 266	1 294	1 073	997	999	939	0	1 092
PIGS										
Pigs	817	372	1 009	1 086	1 130	1 068	1 091	1 014	1 074	1 056
Mainly pigs	1 326	1 063	1 261	1 075	1 049	1 023	967	999	921	1 004
HORTICULTURE IN GREENHOUSE										
Mainly vegetables in greenhouse	7 975	2 073	1 249	956	1 877	1 301	1 315	915	821	1 000
Mainly pot plants in greenhouse	3 359	2 701	1 857	2 835	2 697	1 733	1 206	1 073	858	1 000
HORTICULTURE IN THE OPEN										
Mainly vegetables in open	2 089	3 365	1 414	1 114	1 034	1 633	921	971	867	1 000
Vegetable and mixed farming	0	1 119	870	0	1 316	1 351	687	758	0	944
PERMANENT PLANTINGS										
Fruit and berries	305	5 102	360	568	476	1 408	661	1 574	1 338	1 000
Nursery	1 317	1 052	911	1 286	916	1 131	976	905	0	1 000
All types of farming	1 254	1 202	1 130	1 063	1 032	994	982	990	976	1 014

1) Calculation: SGM * 1000 / (gross margin). ESU = European Size Unit. One unit is equal to 1.200 Euro SGM.

Table 16 shows results for the year 2001. It is important that results for type of farming are close to 1.000, calculated as SGM*1.000/(gross margin). Comparing size groups indicate that the production on big farms is more effective than that on smaller farms.

10. Results from organic and conventional farming

SGM calculations include accounts from both organic farming and conventional farming. Production methods have an important bearing on the economys, which are

illustrated in tables 17 and 18 for a few important activities. Table 18 has a breakdown of costs at a more detailed level as that in table 11.

Table 17. SGM from organic and conventional crops, 2001

	Wheat		Spring Barley	
	Organic	Conventional	Organic	Conventional
Gross output per ha				
Compensatory payment, DKK[1)]	3 541	2 413	3 669	2 406
Quantity, hkg	44,70	75,70	37,00	53,00
Price per hkg, DDK	146,15	83,65	142,08	88,72
Value per ha, DDK	6 533	6 332	5 257	4 702
By-product - straw, DDK	360	490	286	369
Total DKK per ha	**10 434**	**9 235**	**9 212**	**7 477**
Specific costs per ha				
Seeds, DDK	748	391	790	430
Fertilizers, DKK	131	702	90	656
Crop protection, DKK	22	655	5	347
Miscellaneous, DDK	123	136	114	142
Total DKK per ha	**1 024**	**1 884**	**999**	**1 575**
SGM, DKK per ha	**9 410**	**7 351**	**8 213**	**5 902**

1) Compensatory payment includes subsidies for organic farming.

For both crops a higher SGM is observed for the organic than the conventional area. The compensatory payment includes subsidies for running organic farming. It is also worthwhile to notice the lower yield for the organic crops, but it is sold at a remarkably higher price per hkg. The structure of the specific costs reflects that artificial fertilizers and chemicals are not allowed in organic farming.

For both livestock activities it is again observed higher SGM for the organic than the conventional livestock. Differences are mainly due to better product prices and higher subsidies for the organic activities. Costs of concentrates are 10 pct higher for dairy cows on an organic holding.

There are noteworthy deviations between results from organic farming and conventional farming. Results for organic farming are average results where some farms have converted to this production form within the last few years, and therefore they don't yet have the full advantages of prices for ecological products. So in reality the differences could be even greater in organic favour. However, differences in results may be due to other circumstances than the production profile. Examples for crop production are soil quality at regional level. For dairy cows, breed is important. In

comparing organic and conventional results for dairy cows it is also worthwhile to notice that an organic dairy cow demands 0,23 ha extra area to grow roughage, because of a lower yield per ha.

Table 18. SGM from organic and conventional livestock production, 2001

	------- Dairy cows --------		----- Fattening cattle -----	
	Organic	Conventional	Organic	Conventional
Gross output per head				
Increase of meat				
Quantity, heads	0,34	0,38	1,04	1,00
Price per head, DKK	2 860	2 782	3 980	3 537
Value, DKK	978	1 057	4 139	3 537
Other main product, milk				
Quantity, kg	6 796	7 469	-	-
DKK pr kg	2,82	2,43	-	-
Value, DKK	19 150	18 154	-	-
By-product, new born calves				
Quantity, heads	1,03	1,07	-	-
Price per head, DKK	670	641	-	-
Value, DKK	690	686	-	-
Compensatory payment	112	138	1 945	1 484
Total, DKK per head	**20 930**	**20 035**	**6 084**	**5 021**
Specific costs per head				
Replacement				
Quantity, heads	0,34	0,38	1,04	1,00
Price per head, DKK	6 199	5 868	1 283	1 059
Value, DKK	2 120	2 230	1 334	1 059
Variable costs				
Concentrate feed stuffs, DKK	3 772	3 395	2 051	2 083
Purchased roughage, DKK	517	548	128	116
Home grown roughage (spec. cost), DKK	486	661	92	44
Subsidies to fodder crops, DKK	-509	-480	-108	-12
Insemination, DKK	184	213	0	0
Veterinary services and medicine, DKK	344	461	86	79
Control association, DKK	168	163	8	3
Miscellaneous, DKK	240	288	69	47
Total, DKK per head	**7 322**	**7 479**	**3 660**	**3 419**
SGM, DKK per head	**13 608**	**12 556**	**2 424**	**1 602**

The observed deviations *do not* include any recommendations to split up the general SGM calculations.

11. Comparing enumerated SGMs and macroeconomic values

The quality of calculated SGMs is validated. The validation concerns the gross margins and its specifications from year 2001. Data in Farm Structure Survey (FSS) from

individual holdings about crops and livestock are multiplied by estimated outputs and costs, and the results are compared with results in macroeconomics statistics, as 'Gross domestic product at factor costs for agricultural' (GDP). Explanations will be given where big differences occur. Generally, the enumerated SGM-specifications cover a smaller sector than the statistics in GDP. FSS does not include production from small holdings with minimal production. Another fact to be aware of is that GDP is a summarization of production over the whole year, while the enumeration from FFS will refer to a specific date in May. For livestock with short lifecycles (as broilers) it can be a problematic comparison.

The compared values include product subsidies – as for seeds – while area depending on subsidies and animal premiums are not taken into account. High consistency is observed for most of the outputs and costs of great importance. However, there are problems, which need to be investigated. Fruit, eggs and broilers show some of the biggest differences.

Table 19. Comparing enumerated and macroeconomic values 2001, mio. DKK

	Enumerated values 2001	Values from GDP 2001	Difference	Difference in %
OUTPUTS:				
Cereals 1)	8 207	8 062	145	102,6
Pulses	154	126	28	122,2
Potatoes	945	1 041	-96	90,7
Sugar beet	1 091	1 016	75	107,4
Industrial seed (rape)	369	375	-6	98,4
Vegetables in open 2)	582	506	76	115,0
Vegetables under glass	459	443	16	103,6
Flowers under glass+in open 3)	2 654	2 481	173	107,0
Seeds for sowing	664	662	2	100,3
Fruit and berries 4)	229	98	127	233,7
Nursery	594	598	-4	99,3
Roughages 5)	3 609	3 878	-269	93,1
Natural milk	11 405	11 327	78	100,7
Cattle 6)	1 985	2 039	-54	97,4
Pigs 7)	21 693	21 221	472	102,2
Eggs 8)	496	621	-125	79,9
Poultry, meat 9)	967	1 540	-573	62,8
Sheep 10)	34	36	-2	94,4
Furred-animal 11)	2 357	2 659	-302	88,6
COSTS:				
Seed	1 652	1 610	42	102,6
Fertilizers 12)	1 475	1 500	-54	98,3
Plant protection	1 092	1 148	-56	95,1
Feeding stuffs 13)	15 135	15 622	487	96,9
Veterinary services 14)	919	925	6	96,3

1) *Cereals.* The enumerated value is slightly higher than the GDP-value. Both values include cereals used as fodder on the holding. A higher valuation per hkg in the accounts or even a greater yield per ha could be a reason for the deviations.
2) *Vegetables in open area*. Value of strawberries, DKK 97 mio. is added to GDP of DKK 409 mio. SGM for vegetables includes strawberries, but in GDP strawberries are found among fruit and berries. There exist some doubts with respect to the deductions of costs (sales and transport costs etc) in GDP.

3) *Flowers under glass and in open*. As for vegetables, - there exist some doubts with respect to the deductions of costs (sales and transport costs etc) in GDP.

4) *Fruit and berries*. Value of strawberries, DKK 97 mio. is deducted from GDP of DKK 195 mio. A difference of more than 100 pct is unacceptable and must be investigated.

5) *Roughage.* Value of roughage is valued at DKK 0.95 per FU in SGM-context and at 0,90 in GDP. GDP also includes value of secondary fodder crops (about 4 pct of total harvest), which is not taken into account in SGM. In GDP as well as the SGM-calculations a loss of 4 pct before valuation and feeding the animals is deducted.

6) *Cattle*. GDP-value has been reduced according to changes in values of livestock, DKK 138 mio.

7) *Pigs*. GDP-value has been increased according to changes in values of livestock, DKK 152 mio.

8) *Eggs*. The great difference is also observed in the yield of kg eggs per hen. The yield in SGM context is 13,5 kg per hen in GDP about 18,0 kg per hen. However, in the GDP calculation it has been estimated that about 23 pct of the production is for private consumption at the producer or direct sales from the farm; it might be an overestimation!

9) *Poultry meat.* The great difference seems to be due to the fact that FSS data don't properly reflect how many broilers (or other poultry) have been slaughtered. Rearing broilers is an activity with short lifetime for each chicken, where the broiler houses often are empty for cleaning. If the farm structure survey takes place when houses are empty a too low estimate is found when comparing with

number of slaughtered poultry during the year. For broilers the FFS registration seems to be at least 33 pct lower than the registrations of slaughtered broilers. The rearing and cleaning period in SGM calculation is about 56 days and about 42 days in GDP and FSS connection.

10) *Sheep*. GDP-value has been reduced according to changes in values of livestock, DKK 2 mio.

11) *Furred-animals.* The low enumerated value is due to differences in registration of prices for fur-skin. Values in accounts reflect the sales price with the deducted costs involved in killing the animals and cleaning the fur. The GDP-value reflects auction sale prices. The difference of 10 to 12 pct seems reasonable.

12) *Fertilizers*. GDP-tables include 'lime and marl' with DKK 60 mio. In the comparison this value is deducted from the total GDP value, DKK 1.560 mio.. Please notice also that the GDP value comprises the sales of the year. It might be different from recordings in accounts, where fertilizer costs refer to the actual used quantity – taking into account stocks changes from one year to the next.

13) *Feeding stuff – concerning concentrates*. GDP-tables include 'grass and green fodder', 'molasses' and 'pulp and dregs' with 4.025 mio. In the comparison this value is deducted from the total GDP value, DKK 19.647 mio. The three items are categorized as roughage in the context of the account statistics.

14) *Veterinary services*. The GDP for veterinary services has a value, which is based on the account statistics with a small addition to represent the whole agricultural sector. So it is not surprising that the two values are almost equal.

In an overall view the comparisons seem fairly good. GDP is normally calculated for the whole country with no subdivisions. The fairly good results indicate the possibility of calculating some main values of GDP at subdivision (regions or type of farming) by combining the FSS and elements from the SGM calculation - the technique is demonstrated in this chapter.

12. Improvement proposals regarding SGM calculations

In the earlier chapters some suggestions have been proposed about improving the SGM-calculations. Here is a summary:

From chapter 5. In the context of SGM there are two regions in Denmark: The Islands and Jutland. Differences in SGM from important crops are recognized between the two regions, but for other less important crops and all livestock activities SGMs are set equal for the two regions.

In the future - if the SGM system has to be revised - it could become realistic to have *only one SGM applied for the whole country* for crops, too, because there are as much deviations from the standard within each region as there are between regions.

From chapter 5 about calculating SGM as a 3-year average or from a 15-year trend. The intention of using a 3-year average is to avoid the economic results from one year to influence the SGM in an undesirable manner. The gross margin for a single year is affected by the weather and by exceptional prices of products etc. The Danish experiences show that even when using the 3-year average there are consequences in terms of undesirable and unacceptable fluctuations in the SGMs.

Therefore, Denmark has improved the calculation of the SGMs and the results still represent the year in the middle of the three-year period in question. In the improved method of estimating SGM, the gross margins from the latest 15 years are used as observation in a linear regression analysis. The predicted value for the year in question is used as the SGM.

From chapter 5.2 about SGM for cattle in age groups. If the typology system has to be revised in the near future, it might be a good idea to use the same SGM for all three age groups instead of calculating arbitrary SGMs.

From chapter 5.3 about SGM for breeding sows with piglets up to 20 kg. The limit for piglets at 20 kg is very difficult to handle, because in normal agricultural practice, piglets are normally taken from the sows when they have a weight of about 7 kg, and then moved to the fattening stable at 28 kg. This reality ought to be reflected in the definition of SGM activities.

From chapter 10 with results from conventional and organic farming. There are noteworthy deviations between results from organic farming and conventional farming. The observed deviations *do not* mean that the general SGM calculations have to be split up.

13. SGM in economic models

It is mentioned in the introduction that special attentions will be given to the cost elements of the SGM-calculation. The EU Commission has interests in using elements of the SGM in other economic models than the SGM themselves.

As emphasized earlier, most of the costs are recorded as a single entry in the original account and distributed to the relevant activities by an econometric model. The results have to be used bearing in mind that it isn't primary observations for each activity. It has also to be remarked that in some cases - even asking the farmer himself - it would be impossible to allocate costs directly to an activity. Example, the farmer has called for veterinary assistance concerning breeding sows and slaughter pigs as well, and the bill does not specify which animals have been treated. In such cases it will always be a rough estimate to which activity the cost has to be allocated. On the other hand, no doubt exists about veterinary services, if the farmer is a specialist with only one livestock activity. The overall tendency is - more and more - that farmers are going to be specialists.

It is worthwhile to remark that results from the account statistics are already used in estimating some macroeconomic figures in GDP, where no other information exists. Comparing the enumerated SGM elements versus GDP under these circumstances could be more or less meaningless. In an overall view the comparisons between SGM and GDP seem fairly good.

A hypothetical example of using an element of SGM-costs: How much of the total fertilizer costs is used on each type of crops. This question could easily be answered by using the SGM-fertilizer estimates from each activity multiplied by the number of ha, which is counted in the FSS. Meanwhile, a small change in the question causes problems: How much of the total fertilizer costs is used on each type of crops separated on conventional and organic farming? It is obvious that SGM can't be used in answering this question. It is known that organic farms are not allowed to use traditional fertilizers, and the SGM estimates are averages from both conventional and or-

ganic farming. This small example illustrated that SGM should be used with great caution.

Further details of the cost elements:

Seeds and planting stocks. The item includes the value of seed, cuttings, bedding plants etc – and also value of seeds produced on the farm. For some horticultural crops licenses for growing special plants are also included, and it would be possible to have a specification of the license. In general, investments in new permanent crops - such as fruit plantations - are not included.

Energy and lubricants. For agricultural activities fuel and electricity are looked at as a semi-variable cost and are not included in SGM-costs. As for agricultural semi-variable energy costs on horticultural activities are not included in SGM-costs. Meanwhile SGM-costs for horticultural crops include energy for heating greenhouses. Values and quantity could be specified:

- Natural gas
- District heating
- Gas oil
- Fuel oil
- Coal
- Other energy

The value is a part of the row with 'Miscellaneous' in table 13 about nursery.

However, the expanded data source contains a specification of all energy: 'Fuel' and 'Electricity and miscellaneous energy' (see variables 106 and 107 in annex III) allocated to each single activity.

Fertilizers and soil improvements. The item includes purchased fertilizers. And also included are growth medium and a small amount of purchased manure from other farms.

Plant protection and pesticides. The item concerns mostly chemicals. Costs for biological control are also included, and they could be specified as a specific item.

Veterinary services. Veterinary expenses are part of the row with 'Miscellaneous' for livestock activities, see table 10 for dairy cows. Table 11 has specification of the row with miscellaneous. This specification is possible for all livestock activities.

Animal feeding stuffs. This item is separated into concentrates and roughage.
Value of concentrates contain:

- Purchased cereals
- Compound feeds
- Straight feeding stuffs
- Minerals, vitamins etc
- Value of cereals, pulses produced on the farm, valuated at market prices

Value of roughage contains:

- Purchased industrial by-product as molasses, pulp etc
- Purchased roughage from other farms
- By-products produced on the farm and valuated at market prices; it concern by-products from cash crops such as tops from sugar beets and straw from cereals
- Own production of roughage to prices set as the variable production costs
- Deducted compensatory payments concerning own roughage crops

See details for dairy cows in table 11.

Other costs. Further specifications of values are not available. Examples of content could be:

- Twins for big-bales
- Plastic for covering crops
- Disinfectants
- Hoof care
- Hair cutting
- Pots
- Containers for transport
- Specific transport cost

Values from other costs are part of the row with 'Miscellaneous'; see tables 9, 10 and 13.

In all circumstances the SGM results and its specification elements are considered to be reliable. This has been underlined in chapter 11 where detailed results from the SGM calculation are compared with macroeconomic results.

GDP is normally calculated for the whole country with no subdivisions. The fairly good comparisons results indicate the possibility of calculating some main values of GDP at subdivision (regions or type of farming) by combining the FSS and elements from the SGM calculation - the technique is demonstrated in chapter 11.

ANNEX I

Sample selection plans and weighting procedures

This annex contains a short description about selection and weighting accounts for annual statistical reports. The collected data are used in calculating the SGM.

Sample selection plans and weighting procedures are mentioned in this short description for a better understanding of the representativeness of the data source. In this connection it could be mentioned that for some important economic data - value of milk production 2001 for instance – only a small difference of 0,01 pct is observed between the *macroeconomic value* (DKK 11,3 billion) and the *enumerated value from the account statistics*. Greater differences, however, are observed for other variables.

Further information added to FSS (Farm Structure Survey). As already mentioned in chapter 3, the selection of accounts is based on FSS data. Before use, some data about fur-bearing animal have to be added to the FSS data. Unfortunately, FSS does not include fur-bearing animals, but the fur-animal sector is covered by the account statistics. In economic terms, the fur-bearing animal sector is as important as the whole poultry sector in Denmark.

Organic holdings are marked with information from other authorities about date of conversion to organic farming.

Holdings with bookkeeping – useful for statistical purpose - are also marked, and they are then potential holdings for delivering account data as the basis for the account statistic. Not all holdings prepare an account useful for the statistics, so the selection has to focus on holdings, which are able to deliver the detailed account data and other business data. It is evaluated that this limitation can influence the quality of the selected samples, but only to a limited extent.

Classification. All holdings in the FSS are classified according to nine criteria.

Table 1. Classification criteria for agricultural holdings

	Criteria:	Number of groups
1	Sectors: agriculture or horticulture	2
2	Employment, full-time or part-time farming	2
3	Conventional farming or organic farming	2
4	European Size Unit (ESU) based on Standard Gross Margin (SGM)	11
5	General type of farming	6
6	Particular type of farming, within the general type	38
7	Farmer's age	5
8	Regions	11
9	Utilized area	9

Table 2. Field of survey by ESU size and by type of farming, agricultural 2001

	ESU									
	< 16	16 - 26	26 - 40	40 - 60	60 - 100	100 - 140	140 - 250	250 - 500	>500	Total
	Number of holdings									
CROPPING										
Cereals, rape seed, protein crops, set-aside	7 079	3 383	2 161	1 353	822	368	309	80	19	15 574
Mixed cropping	1 311	1 125	680	726	867	394	415	184	36	5 738
Cropping + horticulture	35	31	18	22	31	22	24	9	1	193
Mixed farming + cropping	183	117	68	78	56	62	32	19	2	617
Total, cropping	**8 608**	**4 656**	**2 927**	**2 179**	**1 776**	**846**	**780**	**292**	**58**	**22 122**
CATTLE										
Dairy cattle	87	50	354	869	2 261	1 801	1 837	229	7	7 495
Cattle, breeding/fattening	271	36	42	25	0	9	1	0	0	384
Mixed cattle	6	4	24	7	14	7	11	4	0	77
Cattle/sheep/horses	737	55	20	10	44	10	8	1	1	886
Mixed farming, dairy cattle	0	6	60	40	83	70	126	50	6	441
Mixed farming, cattle/sheep/horses	12	6	4	1	11	1	1	0	0	36
Dairy cattle + cropping	21	88	120	86	296	155	211	59	7	1 043
Cropping + cattle/sheep/horses	1 413	600	412	154	48	21	11	2	0	2 661
Total, cattle	**2 547**	**845**	**1 036**	**1 192**	**2 757**	**2 074**	**2 206**	**345**	**21**	**13 023**
PIGS, POULTRY AND FUR ANIMALS										
Pigs, breeding	8	1	19	36	47	62	120	103	20	416
Pigs, fattening	52	27	49	69	276	330	664	389	90	1 946
Pigs/poultry/fur-bearing animals	12	9	21	37	26	41	44	36	15	241
Pigs/poultry/fur animals + cattle/sheep/horses	10	6	88	13	83	25	54	39	9	327
Pigs/poultry/fur-bearing animals + cropping	169	348	498	613	997	787	1 056	479	72	5 019
Mixed farming	39	0	1	1	3	3	4	3	0	54
Fur-bearing animals	222	249	351	480	348	121	84	20	1	1 876
Total, pigs, poultry and fur-animals	**512**	**640**	**1 027**	**1 249**	**1 780**	**1 369**	**2 026**	**1 069**	**207**	**9 879**
TOTAL, agricultural	**11 667**	**6 141**	**4 990**	**4 620**	**6 313**	**4 289**	**5 012**	**1 706**	**286**	**45 024**

Table 3. Field of survey by ESU size and by type of farming, horticultural 2001

	ESU									
	< 16	16 - 26	26 - 40	40 - 60	60 - 100	100 - 140	140 - 250	250 - 500	>500	Total
	Number of holdings									
HORTICULTURE IN GREEN-HOUSE										
Vegetables in greenhouse	6	11	12	16	27	12	15	10	13	122
Vegetables/flowers in greenhouse	4	7	31	4	6	5	14	5	1	77
Nursery in greenhouse	1	1	2	3	5	2	6	1	0	21
Greenhouse/horticulture in open/cropping	4	4	2	2	2	2	1	2	0	19
Greenhouse/horticulture in open/livestock	0	0	0	0	0	0	0	0	0	0
Other horticulture in greenhouse	0	0	0	0	0	0	0	0	0	0
Pot plants in greenhouse	8	18	23	28	48	59	108	129	74	495
Flowers for cutting in greenhouse	1	0	2	5	4	5	8	0	0	25
Mushrooms	0	0	0	1	0	0	4	2	4	11
Total, horticulture in greenhouse	**24**	**41**	**72**	**59**	**92**	**85**	**156**	**149**	**92**	**770**
HORTICULTURE IN THE OPEN										
Vegetables in open	36	46	24	14	30	16	21	13	3	203
Flowers in open	3	4	2	2	2	1	1	1	0	16
Vegetables/flowers in open	7	5	9	5	8	4	5	1	1	45
Horticulture in greenhouse and in open/cropping	45	18	14	14	43	14	28	12	3	191
Horticulture in greenhouse and in open/livestock	0	0	0	0	0	0	0	0	0	0
Mainly horticulture in open	1	2	0	3	1	1	1	0	0	9
Total, horticulture in th open	**92**	**75**	**49**	**38**	**84**	**36**	**56**	**27**	**7**	**464**
PERMANENT PLANTINGS										
Nursery	25	20	24	25	25	13	24	21	20	197
Nursery/fruit and berries	1	2	5	4	1	3	3	1	0	20
Fruit and berries	83	56	40	25	36	12	13	4	1	270
Permanent plant-ings/horticulture/cropping	7	34	9	5	8	7	4	1	0	75
Mainly permanent plantings	2	1	0	0	1	0	0	0	0	4
Total, permanent plantings	**118**	**113**	**78**	**59**	**71**	**35**	**44**	**27**	**21**	**566**
TOTAL, horticulture	**234**	**229**	**199**	**156**	**247**	**156**	**256**	**203**	**120**	**1 800**
TOTAL, field of survey	**11 901**	**6 370**	**5 189**	**4 776**	**6 560**	**4 445**	**5 268**	**1 909**	**406**	**46 824**
Of which with organic farming	**775**	**378**	**265**	**208**	**295**	**242**	**290**	**36**	**3**	**2 492**

Criteria 4, 5 and 6 are based on the EU typology. Number of ESU groups and Types of Farming are designed to Danish purposes. 11 ESU groups can be aggregated to match EU standard. Types of farming are adjusted to national conditions, but in a manner which fully meets the demands in the FADN sample selection instruction.

The classification results are used to set up tables, which are used in the sample selection. An important table with the field of survey is shown in tables 2 and 3. Different combinations of the other classification indexes can set up many other useful tables.

The typology system is an excellent tool in the sample selection procedure. It helps to present representative statistics. Tables 2 and 3 are central tables for setting up sample size distributed on size groups. There is a rule-of-thumb in sample planning that the sample fraction has to increase with increasing standard deviations for the variables we try to estimate. An optimal distribution of sample size between size groups is calculated with regard to estimating the *best possible result for gross output* in the field of survey. The result from the sample optimising calculation is a guideline for the choice of selection fractions. Experiences from previous years are included too. Table 4 shows typical selection fractions for the agricultural sector, and an example of the calculated sample size. Number of ESU groups is reduced - from tables 2 and 3 - to reflect groups known in the typology.

Table 4. Sample selection fractions and sample size

Agriculture: EU size groups	Selection fractions, pct optimal	used	sample size
< 8 ESU	0,4	0,9	22
8 - 16 ESU	0,5	1,2	111
16 - 40 ESU	1,5	2,0	223
40 - 100 ESU	3,7	2,7	295
100 - 250 ESU	7,4	8,0	744
> 250 ESU	22,6	17,0	339
Total			1 734

Results in the table are examples of calculating sample size; in reality the sample selection fractions are used for conventional agriculture and higher fractions for organic farming.
ESU = European Size Unit. One unit is equal to 1.200 Euro SGM.

Within each size group, the sample size is distributed to types of farming groups in relation to the field of survey. Later on in the selection procedure - when looking at a single cell in tables 2 and 3 - proportionality between the field of survey and sample size has to be ensured on the secondary groups concerning farmer's age, region or/and utilized area.

Assigning weights. The increasing selection fraction between size groups renders the collected account data useless without in some form reflecting this fact. The proportionality between the fields of survey and sample with regard to the distribution to the secondary groups means that the sample in this respect can be considered as 'self

weighting'. It is an important assumption when assigning weights. The weight calculation falls in three steps.

1. In the first step all holdings in the sample are assigned with a provisional weight reflecting the selection fraction. These provisional weights refer to data and condition at the time for selection where one-year old data are in question.

2. In the next step the provisional weights are brought up to date to reflect structural changes in the field of survey. FSS-data for the weighting purpose must refer to same year as the account data. If the number of holdings – sum of provisional weights versus FSS-data – in a specific group has changed from 1.200 to 1.300 holdings then all provisional weights are corrected with the given relation. The changes in the field of survey can be explained due to newer FSS-data and use of newer SGM's in the typology. The corrected weights now refer to the same year as the collected accounts.

3. In the third step the right average size of the weighted accounts is ensured - measured as SGM per holding. The true average size for a specific group is compiled on FSS-data. With the purpose of reaching the right average the weights are calibrated once more by the aid of a regression-estimate between each variable and SGM, where SGM is the independent variable. In this manner all averages of account variables are adjusted according to the connection between each single variable and the SGM.

About the representativeness of the account statistics it should be noticed that the used selection method does not allow an objective compilation of standard deviations. It is assumed that some variables can be affected by systematic errors. However, for some important structural and economic variables high concordance is observed between macroeconomic observations and results from the account statistics.

ANNEX II

Activities in the expanded data source with correspondence to SGM-activities

Rows, where the SGM-code in column 1 is the same, have to be concatenated in the SGM-context. Example: spring barley and winter barley have to be added together.

Lines concerning livestock with more SGM-codes have to be split up, when calculating SGM.

SGM for J/12, sows include piglets up to 20 kg and SGM for J/13, other pigs include piglets from 20 kg.

SGM for livestock is per annual head.

Activities in the expanded data source and correspondence to SGM-activities

	---------- Expanded data source ----------		---- "SGM2000", euro [2] ---	
SGM code [1]	Activity name	Activity Unit	Islands	Jutland
	Crops for sale.			
D/04	Spring barley	Hectare	861	748
D/04	Winter barley	Hectare	861	748
D/01	Wheat	Hectare	1 004	659
D/03	Rye	Hectare	776	711
D/05	Oats	Hectare	789	724
D/05	Mixed cereals	Hectare	789	724
D/14 A	Peas for canning	Hectare	909	894
D/09	Pulses	Hectare	740	690
D/10	Potatoes	Hectare	3 507	2 837
D/11	Sugar Beets	Hectare	2 070	1 513
D/13	Rape seed	Hectare	781	763
D/19	Grass seed	Hectare	1 051	917
D/19	Clover seed	Hectare	1 051	917
D/18	Roughage crops for drying	Hectare	896	896
D/20	Other sales crops	Hectare	562	562
D/14 B	Various brassicae	Hectare	7 448	7 448
D/14 B	Carrots	Hectare	7 448	7 448
D/14 B	Onions	Hectare	7 448	7 448
D/14 B	Leeks	Hectare	7 448	7 448
D/14 B	Other vegetables, open air	Hectare	7 448	7 448
G/01	Fruits and berries	Hectare	3 568	3 568
	Other horticulture crops	Hectare	7 448	7 448
D/13	Non-food, mainly rape	Hectare	781	763
D/22	Set a side	Hectare	348	348
	Small-scale forestry	Turnover, DKK 10.000		
	Contract operation services	Turnover, DKK 10.000		
	Roughage etc.			
	Green manure crops	Hectare		
D/12	Fodder beets	Hectare	1 393	1 393
D/18	Grass (crop rotation)	Hectare	896	896
F/01	Permanent pasture	Hectare	896	896
D/18	Corn, total crop	Hectare	896	896
D/18	Cereals, total crop	Hectare	896	896
D/18	Peas, total crop	Hectare	896	896
	Late crop	Hectare		
	Free-range pasture (pigs)	Hectare		

To be continued next page.

Activities in the expanded data source and correspondence to SGM-activities

	---------- Expanded data source ----------		---- "SGM2000", euro [2] ---	
SGM code [3]	Activity name	Activity Unit	Islands [4]	Jutland
	Livestock			
J/07	Milk cows	Annual heads	1 609	1 609
J/08	Nurse cows	Annual heads	368	368
J/02,J/04,J/06	Breeding cattle	Annual heads	57/77/61	57/77/61
J/02,J/03,J/05	Slaughter calves	Animals produced	57/163/166	57/163/166
J/12 and J/11	Sows and piglets up to 7 kg	Annual sows	462	462
J/11	Piglets, 7-28 kg	Animals produced	59	59
J/13 and J/11	Slaughter pigs	Animals produced	59	59
J/15	Hens (egg production)	Annual heads	445	445
J/14	Broilers	Animals produced	140	140
J/16	Other poultry	Annual heads	2 129	2 129
J/01	Horses	Annual heads	26	26
J/09	Sheep	Annual mother sheep	11	11
J/19	Fur-bearing animals	Breeding females	72	72
	Other livestock	Value, DKK 10.000		
	Other activities			
	Building rental	Rent, DKK 10.000		
	Other sources	Output, DKK 10.000		
	Horticultural crops [5]			
D/14 B	Vegetables in open air	Hectare	7 448	7 448
D/15	Vegtables under glass	Hectare	290 242	290 242
D/16	Flowers in open air	Hectare	19 062	19 062
D/17	Flowers under glass	Hectare	565 562	565 562
G/01	Fruits and berries	Hectare	3 568	3 568
G/05	Nursery i open air	Hectare	18 617	18 617
G/06	Other permanent crops	Hectare	3 568	3 568
G/07	Permanent crops under glass	Hectare	290 242	290 242
I/02	Mushrooms	100 square meters	20 877	20 877

1) SGM calculation refer to the concatenated activities in lines with equal SGM code.
2) Conversion rate: Euro 1,00 = DKK 7,44713.
3) Lines concerning cattle with more SGM codes have to be split up, when calculating SGM; SGM for J/12, sows include piglets up to 20 kg and SGM for J/13, Other pigs include piglets from 20 kg.
4) SGM for livestock is per annual head.
5) The expanded data source does not contain these horticultural crops.

ANNEX III

Specification of activity variables in the expanded data source

The listed variables are the result from converting the original farm data about earnings and costs into a gross margin account at *activity level*, also called the expanded data source. Some variables are transferred without further calculation while other variables have to be distributed to the actual farm activities according to a distribution algorithm; see also chapter 4 and annex 4.

The words ’primo’ and ‘ultimo’ are used in this annex.

‘Primo’ is used as an abbreviation for values/figures at the beginning of a year in a balanced sheet.
‘Ultimo’ is used as an abbreviation for values/figures at the end of a year in a balanced sheet.

In general the balanced sheets cover the calendar year.

1. Activity units
Area in ha for crops and number of animals for livestock, which can be annual heads or produced animals.

3. Amount, main product
Where amounts are given, these are transferred directly.

- Crop yield, hkg. is available for cereals, peas, sugar beets, potatoes, seed crops, and rape
- Standard milk yield, kg from dairy cows
- Piglets produced per annual sow
- Eggs, kg for hens
- Weight, kg for slaughter calves at the time for slaughtering
- Weight of purchased piglets in the activity with slaughter pigs

4. Amount, by-product
Yield of straw for cereal is listed as FU (feed units). A maximum yield is estimated. The yield is based on Statistics Denmark's figures for a mount of straw in relation to grain yield. A similar estimated yield is used for top/leaves from sugar beet and straw of seed; the estimations are based on normative figures for FU yield per hectare.
Thus, the amount listed does not represent actual used production, which is calculated under feed consumption.

5. Irrigation, etc.
For crop activities, it is stated whether irrigation is possible on the holding. Though, it must not be assumed that all activities on the holding are irrigated, and the information is only used in the general review of the account by the operator.
In the livestock section the variable is used to list sales weight of piglets.

6. Animal breed
Within the bovine division, this variable contains the breed code for the herd, and in the fur division the breed and gender is listed here.

7. Stable type
For dairy herds, stabling type is listed here.

9. Labour input, hours
Key figures are used to determine the labour input for the various activities. The distribution is based on the stated *total labour input for each holding*.
The key figures are regulated to accommodate labour saving related to contract operations for each activity, calculated in variables 109 and 110. Effects according to size-of scale have been observed in regression analysis, and have been taken into the calculation.
Likewise, the analyses show a markedly higher labour input for organic cropping section, and adjustments have been made accordingly.

Capital input primo, DKK

Several of the capital inputs in the original account refer to all activities. The distribution results are used to create the calculated interest of 4%.

10. Stock, purchased
Value of purchased stock primo is distributed among activities by key figures, based on regression analyses.

11. In-farm produced stock
Since most stocks in the original farm accounts are specified for activities, most primo values have been transferred directly. Primo value for straw has been transferred to the cereal crop with largest crop area.
Value of pelts from fur-bearing animal is also listed here.

12. Livestock value
Primo value of livestock has been directly transferable to each activity. Where the activity unit is smaller than 1/10 unit, the value has been transferred to the activity '*Other Sources'*.

13. Equipment value
Key figures have been used to distribute equipment value primo between activities. In analyses of crop activities, capital input was proven to rise with increased soil quality (heavier soil types), which was added to the modelling.
Reduced input per unit according to scale-of-size has been proven for cattle and pigs activities and is taken into the calculation.

In the modelling, key figures are regulated to reflect variations in capital savings when using contract work, see variables 109 and 110.

14. Value of building

The property tax assessment and its information concerning land value and property value are used to divide capital input between land value and building value. This assessment uses the so-called 'farm rule', meaning that any land is assessed as belonging to a medium-sized holding and by that it often gives a lower value than the market price. Buildings are not assessed separately, but as a difference between total property value and land value, and for a large number of holdings the building value stated does not reflect actual building value. However, no acceptable alternative has been found. Analyses have shown an increased building value in crop activities with a high soil quality, and this effect has been incorporated into the modelling. Another result of the analyses is that estimated key figures are more precise when farms with cropping are exempt from the calculation. No doubt, this is caused by the fact that these farms with cropping often have buildings (old, disused byres, for instance), which play no part in the actual farm income. To avoid such unused buildings from influencing the individual activity, a maximum building capital per unit has been built into the modelling. Excess values are transferred to '*Other sources'* in order to retain consistency with the original accounts.

15. Land value

The distribution of land value primo has been made according to area usage; meanwhile permanent grazing is added to the distribution with a weight of only 2/3, and secondary crops with a weight of 1/3.

16. Value of land stock

Value of land stock primo is distributed by key figures, established by regression analyses.

17. Milk quota value

The milk quota value is transferred directly to dairy cows from the original accounts.

Roughage production

This chapter will discuss the calculation of roughage production. This calculation concerns the 9 roughage-producing activities, as the term also covers green manure crops and fields for outdoor sows.

22. Yield, FU

The roughage yield expressed in feed units (FU) is calculated using norm yields for single crops in the relevant county, supplemented with an evaluation of the fertilizer and manure consumption on the holding. A high rate will give larger yields, whereas a low rate will cause a deregulation of the yield.

The yield estimates are based on data from Statistics Denmark. Data covers yields for specific crops subdivided by county (treating Copenhagen, Frederiksborg, and Roskilde counties as one region).

The yield of silage pulses is calculated by a reduction of the county-level grain silage production, as there is no separate yield. Aftermath and free-range areas are calculated on the basis of yields at country level.

Yield figures are adjusted to allow an estimated loss, in order to obtain an accurate estimated yield, expressing the effective roughage production. The national average yields are published in chapter 4, table 4.

For organic farms the estimated yields are reduced by a factor determined from accessible expert evaluations, 20 pct.

The estimated yields in the model have been made manually editable to be able to reflect feed requirements on each single farm.

23. Gross sales, FU

Variable 27 *'Gross sales, DKK'* determines the value in this variable as a direct transfer of positive gross sales within the various roughage crops, dependent on actual sales corrected for stock fluctuations. Rent income from grass acreage has been incorporated into the sales figure, and placed under the grass crop with the greatest acreage.

Sales figures have been modelled as feed units by a fixed price. Results from the modelling have been made manually correctable on each single farm.

24. Home grown roughage for feeding purpose, FU

The difference between yields and sold roughage for the various activities is calculated from variables 22 and 23 and used in the roughage distribution, cf. variables 63 – 70.

25. Purchased roughage, FU

Variable 29 *'Purchased roughage, DKK'* contains the cost of purchased fodder beets as well as grass, grazing rental, and whole green roughage (incl. stock dwindling), transferred from the holding accounts. The number of feed units, calculated from a set

of fixed prices, is manually correctible on each single farm. The calculated feed units are used to perform the fodder distribution in variables 60 and 61.

27. Gross sales, DKK
Discussed under variable 23.

29. Purchased roughage, DKK
Discussed under variable 25.

Livestock turnover, number

The next two chapters cover livestock turnover. Variables 31-40 cover the heads turnover, and values are covered by variables 42-50. Gain in weight is covered in variable 53.

31. Ultimo, livestock
Information covering livestock (could cover breeding animals only) is transferred directly from the accounts. Numbers are not given for the activity 'Other Livestock'.

32. Ultimo, piglets >7 kg
Variable is only relevant for sows. The variable is also used for baconers to cover the number of sold pigs for breeding purpose.

33. Livestock, sales
Number of animals sold is recorded in the account and the number is transferred to this variable. For cows and sows it covers breeding animals only.
There is no information on sales head counts to and from other activities.

34. New-born calves and piglets, sales
The recorded number of sold new-born calves, as well as the number of dead calves, is listed here. In the activity listing, they are registered under dairy cows and nurse cows.
Provisions for the household from cattle are transferred to 'Slaughter calves'; however, if this activity doesn't exist provisions are transferred to 'Breeding cattle'.
Concerning 'Sows' the variable contains information about number of sold piglets at a weight of seven kg.

On activity 'Slaughter pigs' it is the number of pigs used as provision of the household.

35. Livestock, dead
Information about dead cattle and pigs are transferred directly to the relevant activity. However, stillborn calves and piglets are not taken into account.

36. Transfer to other activities
The variables for 'Dairy cows' and 'Nurse cows' are the calculated number of calves, which have been transferred to other activities 'Breeding cattle' and 'Slaughter calves'. The number of calves has been calculated in a balanced sheet for the total herd. The calves are split up proportionally where 'Dairy cows' as well 'Nurse cows' exist on the same holding.
The variable for 'Breeding cattle' gives the number of heifers-in-calf, which are transferred to 'Dairy cows' or 'Nurse cows'. The number of heifers has been estimated according to given information about the cows.
The variable for 'Sows' gives the number of piglets at 7 kg, which are transferred to the activity 'Piglets 7-28 kg', whereas for this activity is given the number of piglets at 28 kg transferred to 'Slaughter pigs'.
The variable for 'Slaughter pigs' gives the number of breeding animal transferred back to the activity 'Sows'. The number has been estimated according to the given information.

37. Primo, livestock
See explanation under variable 31.

38. Primo, piglets < 7 kg
The variable contains the number of piglets at the beginning of year.

39. Livestock, purchases
The variable contains the number of purchased animals. The number is recorded in the original account.

40. Transferred from other activities
Information in this variable corresponds to calculation in variable 36.

Livestock turnover, value

42. Ultimo, livestock
For all livestock activities the variable contains value of the herd at the end of year. 'Sows' include also the value of piglets up to 7 kg.

43. Livestock, sales
The variable gives the sales value for all livestock activities; however values concerning new-born calves and piglets at 7 kg are found in variable 44. The information has been transferred directly from the original account.

44. New-born calves and piglets at 7 kg, sales
The variable contains sales values, transferred directly from the original account.

45. Livestock, dead
The variable contains possible sale values or cost for dead animals. This specification is only given for cattle and pigs - as for variable 35.

46. Transferred to other activities
The variable contains estimated values of animals transferred to other activities; the number of animals is stated in variable 36. The applied prices are based on data in accounts and prices statistics as well. For heifers-in-calf - especially – it has been estimated that heifers growing up on the farm has a better quality than purchased heifers. The prices are announced in chapter 4, table 3.

47. Primo, livestock
For all livestock activities the variable contains value of the herd at the beginning of the year. 'Sows' include also the value of piglets up to 7 kg.

48. Livestock, purchases
The variable contains recorded information about costs for purchased animals. The costs are transferred directly to the relevant activities.

49. Transferred from other activity
Information in this variable corresponds to calculation in variable 46.

50. *Market conditions, - price-related changes in values*
The recorded price-related changes – from beginning to end of year – in livestock values for cattle have been distributed to the cattle activities using key figures. The key figures are based on guidelines from FOI for cattle-prices and changes, when valuing livestock capital at the beginning and end of the year.
The recorded price-related changes for activities with pigs have also been distributed using key figures, - principally as for cattle.
The recorded price-related changes for activities with poultry are distributed according to a rough estimate in cases where more poultry-activities exist on the holding.
Other recorded price-related changes have been transferred directly to the actual activity.

53. Gain in weight, slaughter animals, kg
The gain in weight for 'Slaughter calves' is calculated based on:

- Number of sold animal
- Recorded average weight for slaughtered calves
- A rough estimate of average weight of purchased calves
- A rough estimate of average weight of dead calves
- A rough estimate of average weight of transferred calves form other activities

The estimation takes breed into account – jersey or breed of heavier cattle. The estimation is subject to uncertainty.
The gain in weight for 'Slaughter pig' is calculated based on:

- An estimated average weight at slaughter time
- Recorded average weight of purchased piglets
- A rough estimate of average weight of transferred piglets from other activity
- A rough estimate of average weight of dead pigs

It is stated that this estimation is subject to with uncertainty, also

Fodder consumption, FU

The distribution of fodder – concentrates and roughage – takes place only for the livestock activities. Key figures are mainly based on normative guidelines. Between holdings a great variation in the roughage composition is observed, and consequently the distribution to each livestock activity is also subject to uncertainty. Manual control of the calculated results from the distribution model has to be carefully conducted, to ensure believable and right fodder consumption – also between the livestock activities.
Distributed fodder in FU (feed units) is later on used as key figures when distributing the associated costs.

55. Cereals and concentrates

Between livestock activities a high variation has been observed in composition of cereal and concentrates and also in prices for type of concentrates. Therefore, for each activity the distribution of cereal and concentrates is based on normative figures and connected prices in DKK per FU. The figures are compared with results from regression analyses of fodder costs per activity unit. Prices per FU are published in chapter 4, table 5.

The above is the bases when calculating an average FU-price for consumption of cereals and concentrates on each single holding. However, the price has to be regulated according to a discount of 2-6 pct, - depending on the volume of purchased fodder. The discount calculation is set up for estimates from price statistics compiled by FOI.

Costs on the holding to cereals and concentrates, including the valued consumption of home grown cereal, are hereafter converted to FU and consequently distributed to the actual activities based on the above-mentioned normative figures.

A special price set is used for organic holdings, and likewise the price for farm internally consumed cereals by the farm is valued at a higher price than on conventional holdings.

59. Other feedstuffs

This item includes molasses, pulp, beet root pellets etc and are converted into feed units by a fixed annual price. The conversion can be changed during the data quality control performed for each farm. The distribution to the activities is according to key figures.

60. Purchased fodder beet roots

61. Purchased grass and green fodder

The purchased feed, as converted into feed units according to variable 25, is distributed to the relevant livestock activities, based on key figures.

62. Purchased straw from cereals

The purchased straw is, after reduction for straw to bedding, (described in variable 71) converted into FU for the livestock activities. It is distributed to the livestock activities according to key figures. Although the quantity exceeds standard needs the purchased volume is used in the calculations. The quality of calculations is affected by the fact that prices vary very much depending on transportation costs have to be paid by the buyer or the purchaser.

Home grown roughage in variables 63,.., 70. The feed units, calculated as described under variables 22 and 24, are distributed to the livestock activities according to key figures.

63. Home grown fodder beetroots
64. Home grown grass in rotation
65. Home grown permanent grass
66. Home grown silage maize
67. Home grown silage cereals
68. Home grown silage pulses
69. Home grown aftermath, - secondary crops
70. Fields for sows etc

71. Home grown straw
Internal use of straw for fodder and bedding, respectively, is calculated based on standard needs. This calculation is expected to be validated for groups of farms, but not for the single farm, because of different stable systems etc.

The standard needs are according to normative figures and the result of the calculations has been validated against surveys from Statistics Denmark. The share of the need, which is not covered by purchased straw, is expected to be from production on own fields, described in variable 4.

The share of straw for bedding is estimated for every activity and is expected to come from home grown as well as purchased straw. The valuation of straw is set at DKK 1,00 per feed unit.

72. Home grown top from sugar beets and straw from crops with seeds.
The feed units for these by-products are distributed according to key figures. However, the production (see variable 4) is often on farms with a low number of livestock and the amount of feed allocated is limited in the model. The operator can correct the estimations for each single farm.

Value of output

Variables 78 to 96 are used for elements in the total economic output on every activity. In general the first section of variables is for crop outputs and the second part for outputs from livestock production.

78. Main product, sale, cropping
For cereals, pulses, potatoes etc. the value of sale, including changes in stocks is directly transferred to this variable from the farm accounts.
On '*agricultural service'*, the total output (income from others) is transferred to this variable.
For roughage crops no output-value is calculated. Sale of roughage is recorded under '*Other activities'*.

79. Main product, in-farm, cropping
Values of cereals, pulses, potatoes etc used at own farm are transferred to this variable according to information from the farm account.

80. By-products, sale, cropping
Values of sold straw are distributed to the single type of cereals - using production in variable 4 as key figures. Value of sale of tops from sugar beet production and straw from grass seed production are also placed here.

81. By-products, in-farm, cropping
Value of intra-used straw, calculated as described in variable 71 is distributed using same key figures as in variable 80. The value of internal used tops from sugar beet production and straw from grass seed production is also placed here.

83. Specific subsidies
Area-related subsidies from the EU-CAP-regime (including subsidies for grass and leguminous seeds) are placed here, in general transferred directly from the farm account. Subsides to silage maize, cereals and pulses are allocated to these activities.

On animal production, the subsidies for nurse cows, calves for slaughtering, sheep etc. are transferred to this variable.

86. Specific subsidies transferred to livestock
The specific subsidies to production of roughage are further transferred to output from animal production activities, using the amount of fodder as key figures.

87. Sale of raw milk, eggs, wool etc
Sale of raw milk, eggs etc is transferred to this variable. Furthermore, output from hired-out-stables for horses is recorded (activity: 'Other activities'). For nurse cows a milk value is estimated (1.600 kg at DKK 2,00 per kg) and it is also included in the fodder costs (variable 120).

88. Value gain, livestock
From variables 42-50 the gained values of livestock for the single activity are calculated and included in this variable.

89. Manure, sold
The income from sold manure is recorded here, distributed to livestock activities according to the calculation described in variable 90.

90. Manure used at own farm
For each activity with livestock the production of manure is estimated. The calculations are based on the normative values for nitrogen, phosphor and potassium for different kinds and size of animals. For each type of nutrients a (semi-official) utility rate and a shadow price on fertilizers is used to estimate an average value of produced manure per head.

To take into account the actual use of fodder an average value per 1000 feed unit is used as input to calculate the actual manure value on the farm.

If the number of livestock units at the farm exceeds a corresponding area the surplus of produced manure - deducted the sold part - is expected to be delivered at a neighbouring farm without any payment. Then only the intra-used part of manure is subject to valuation at the livestock activities. The ex-farm delivery is recorded under '*Other activities'*.

91. Farm family consumption
The value of products used by the farmer family (milk, eggs, meat etc) is transferred from the farm account to this variable.

92. Miscellaneous output from livestock production
The value of miscellaneous output from cattle, pigs and other livestock is distributed to the single activity based on the number of livestock units.

93. General subsidies
Subsidies not related to a single activity - but the farm as such - are recorded in this variable. The subsidies include, among others, subsidies for improvement of farms, subsidies for young farmers, subsidies to farmers in marginalized region and to environmentally careful management.

Each subsidy is distributed to activities according to its aims, but only the total for each activity is kept in the expanded data source.

94. Subsidy for organic farming
This general subsidy is transferred to this variable, and distributed by using the crop areas as key figures.

96. General subsidies transferred to livestock
The general subsidies in variables 93 and 94 allocated to production of coarse fodder are further transferred to output from animal production activities, using the consumption of fodder as key figures.

Variable costs, cropping

In this part the distribution of variable costs, mainly related to cropping is described. In general the key figures are results of regression analyses, but for some less important activities, normative figures are used.

101. Seeds for sowing
The recorded seed costs in the farm account are together with intra-used seeds distributed to the crop activities. For organic farm special key figures are used.

102. Fertilizers
The recorded fertilizer costs in the farm account are distributed to the crop activities. For organic farm the costs of allowed natural nutrient-products are reported here.

103. Manure, purchased

104. Manure, from own livestock
Costs are distributed using key figures for three main types of farming. The key figures are calculated by regression analyses.

Manure delivered from other farms (to crop farms) without payment is not taken into the calculation. Therefore, the costs do not reflect the total use of manure.

105. Plant protection
Pesticide costs etc., originating from the farm account are distributed using key figures from regression analyses.

106. Fuel
Fuel costs etc., originating from the farm account are distributed using key figures from regression analyses. If contract operations occur, the key figures are reduced for expected lower use of fuel on the relevant activities.

107. Electricity and miscellaneous energy
Electricity costs etc., originating from the farm account are distributed using key figures from regression analyses. Analyses have shown that large herds with sows and piglets use more electricity per unit than on average, and this is included in the handling of key figures when distributing costs. The distribution includes the livestock production activities.

108. Fees for use of water
Costs related to water, which can be costs for the amount used as well as general costs for connection to a water supply system, are distributed by use of key figures. Some key figures are more based on general assumptions, because of a low quality of the regression analyses.

109. Contract operations I (harvesting and straw pickup)
Contract operation costs are in general divided into harvest activity and other activities in the farm accounts. The aim is to increase the quality of cost distribution. Key figures are from regression analyses combined with price lists etc.

110. Contract operations II (other operations than harvesting and straw pickup)
In this variable also costs for bringing out manure to the fields are included and allocated to the livestock production activities. Key figures are from regression analyses combined with price lists etc. Size effects have been observed in the analyses and this element is incorporated in the distribution.

111. Drying and storage rental
Costs on these items differ widely from farm to farm depending on why some farms have own facilities. Because of that, key figures for distribution of the costs are not very valid.

112. Miscellaneous costs related to cropping
Key figures for distribution of the costs are used, however more based on estimates than on valid analyses.

114. Calculated interest on stocks related to crop production.
An interest of 4 per cent of the distributed value of stocks, as described in variables 10 and 11, is recorded in this item.

115. Green manure costs
On farms where green manure is part of rotation, mainly organic farms, the variable costs on this field are distributed to other crops, based on areas.

Variable costs, livestock production

In this part the distribution of variable costs, mainly related to livestock is described. The variables include transfer of variable costs on roughage crops to livestock activities.

120. Fodder cereals and concentrates
The costs for fodder cereals and concentrates, including use of home grown cereals and milk from nurse cows are distributed. The distribution of feed units (variable 55) combined with fodder prices are used as key figures.

122. Other feedstuffs
Costs are distributed to the single activities according to the feed unit distribution as described in variable 59.

123. Purchased roughage
Costs are distributed to the single activities according to the feed unit distribution as described in variables 60 and 61.

124. Straw for fodder
Costs on purchased as well as intra used straw for fodder are distributed to the single activities according to the distribution of feed units in variable 62.

125. Straw for bedding
Costs on purchased as well as intra used straw for bedding are distributed to the activities according to the distribution of feed units in variable 71.

126. Home grown by-products
Costs on tops from sugar beets and straw from grass seed production are distributed to the activities according to the distribution of feed units in variable 72.

127, 128 and 130. Costs are distributed to the activities according to key figures based on regression analyses.

127. Insemination

128. Veterinary service and medicine

130. Control association costs

131. Miscellaneous costs related to animal production
Key figures for distribution of the costs are used, however more based on estimates than on valid analyses.

133. Calculated interest, herds and stocks related to animal production.
An interest of 4 per cent of the distributed value of stocks, as described in variables 10 and 12, is recorded in this item.

135. Variable costs regarding home-grown fodder beetroots
Based on the distribution of feed units (variable 63) the variable costs on fodder beetroots are transferred and distributed to the relevant livestock activities. In case of sale, the costs allocated to livestock activities are reduced relatively to the sold share.

136. Variable costs regarding home grown grass
Based on the distribution on feed units (variables 64-65 and 69-70) the variable costs on different types of grass are transferred and distributed to the relevant livestock activities. To obtain the most valid result the four types of production in the model are distributed individually. In case of sale, the costs allocated to livestock activities are reduced relatively to the sold share.

137. Variable costs regarding home silage maize and cereals
Based on the distribution on feed units (variables 66-68) the variable costs on silage maize, cereals and pulses are transferred and distributed to the relevant livestock activities. To obtain the most valid result the three types of production in the model are distributed individually. In case of sale, the costs allocated to livestock activities are reduced relatively to the sold share.

Semi-variable costs

141. Labour input value
Based on the distribution of total working hours (variable 9) the salaries to employees plus estimated value of family labour input are allocated to the single activities.

142. Maintenance, equipment
The distribution of equipment costs to the activities is based on key figures from the regression analyses. These analyses have shown higher costs for crops depending on soil quality and a size effect for dairy cows. The distribution in the model takes these elements into the calculations. Furthermore, key figures (mainly for crops) are adjusted by the use of contract operations.

143. Depreciation, equipment
The distribution of depreciation is according to key figures and adjusted for the same effects as in variable 142.

145. Calculated interest, equipment
An interest of 4 per cent of the distributed value of equipment, as described in variable 13, is recorded in this item.

146, 147 and 148. The semi-variable costs on roughage crops are transferred to animal production activities by the same methods as described for variables 135-137.

146. Semi-variable costs regarding home grown fodder beetroots

147. Semi-variable costs regarding home grown grass

148. Semi-variable costs regarding home grown silage maize, cereals and pulses

Capacity costs

152. Real property tax
The tax, a land value tax, is distributed according to land value (variable 15).

153. Co_2-tax
The tax is distributed by using the total energy costs on the single activities as key figures. It is taken into account that there is a different weigh of tax on fuel and electricity.

156. Insurances
The distribution of insurance costs is based on key figures from the regression analyses.

157. Car costs
The farm related costs of private cars are distributed by key figures. However, on some less important activities, the key figures are estimates.

158. Miscellaneous costs
General miscellaneous costs (accounting service, phone, PC, etc.) are distributed by key figures. However, on some less important activities, the key figures are rough estimates.

159. Maintenance, buildings
The distribution of costs is based on key figures from regression analyses. On good soil higher costs on crop production are observed, which are taken into account.

As described in variable 14, some buildings are not used for agricultural purpose any more. Therefore, also on maintenance, a limit for allocation to the single activities is used.

160. Depreciation, buildings
The distribution of costs is based on the same principles as variable 159.

161. Maintenance, land improvement
The distribution of costs is based on the same key figures as distribution of land value (Variable 15).

162. Depreciation, land improvement
The distribution of costs is based on the same key figures as distribution of land value (Variable 15).

164. Calculated interest, buildings and milk quota
An interest of 4 per cent of the value of owned buildings and owned milk quota, as described in variables 14 and 17, plus rents for rented buildings and milk quota are recorded in this item.

165. Calculated interest, land and land stocks
An interest of 4 per cent of the value of land and land stocks, distributed as described in variables 15 and 16, plus rent for rented land, are recorded in this item.

166, 167 and 168. The capacity costs on roughage crops are transferred to animal production activities by the same methods as described for variables 135-137.

166. Capacity costs regarding home grown fodder beetroots

167. Capacity costs regarding home grown grass

168. Capacity costs regarding home grown silage maize, cereals and pulses

Input factors transferred to livestock activities

In the model there is, similar to costs on roughage crops, a transfer of areas, labour input and capital input to livestock activities. The results are in the variables 172-182. The input factors are distributed in accordance with the same principles as described under items 135-137.

172. Area, fodder beet

173. Area, grass

174. Area, silage maize, cereals and pulses

176. Labour input, fodder beetroots

177. Labour input, grass

178. Labour input, silage maize, cereals and pulses

180. Capital input, fodder beetroots

181. Capital input, grass

182. Capital input, silage maize, cereals and pulses

ANNEX IV

Converting annual farm account into a Gross Margin Account

The econometric model

This annex contains a graphic layout of the econometric model. There are three pages about crop activities and three pages about livestock activities. The graphic layout doesn't give all details in the modelling. The columns have the following meanings:

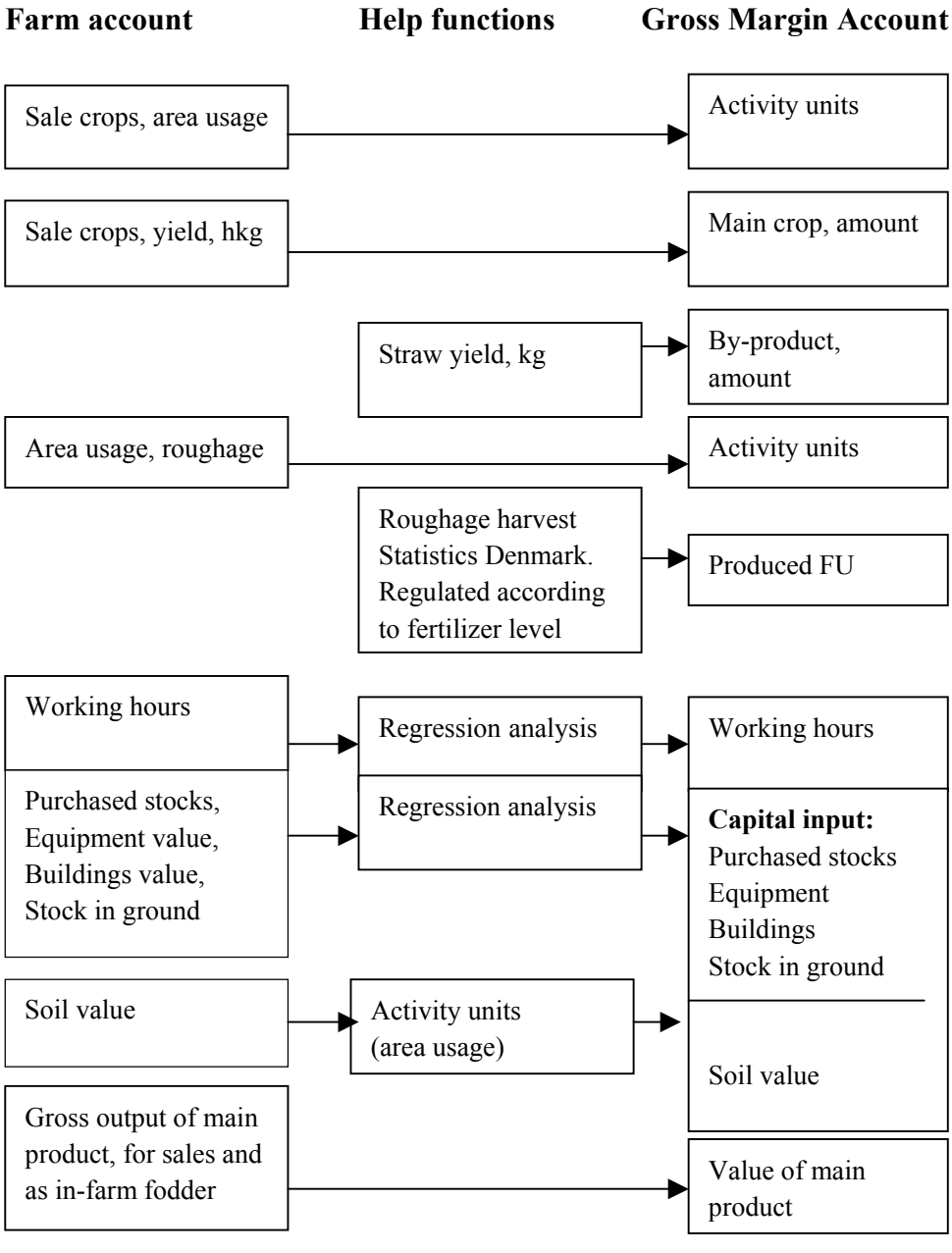
1. Column one has account information about earnings and costs as recorded in the original collected farm account. Many outputs are specified at activity level while most costs are found as a single entry.

2. Column two indicates how information is transferred into a Gross Margin Account or how new information is connected to the account.

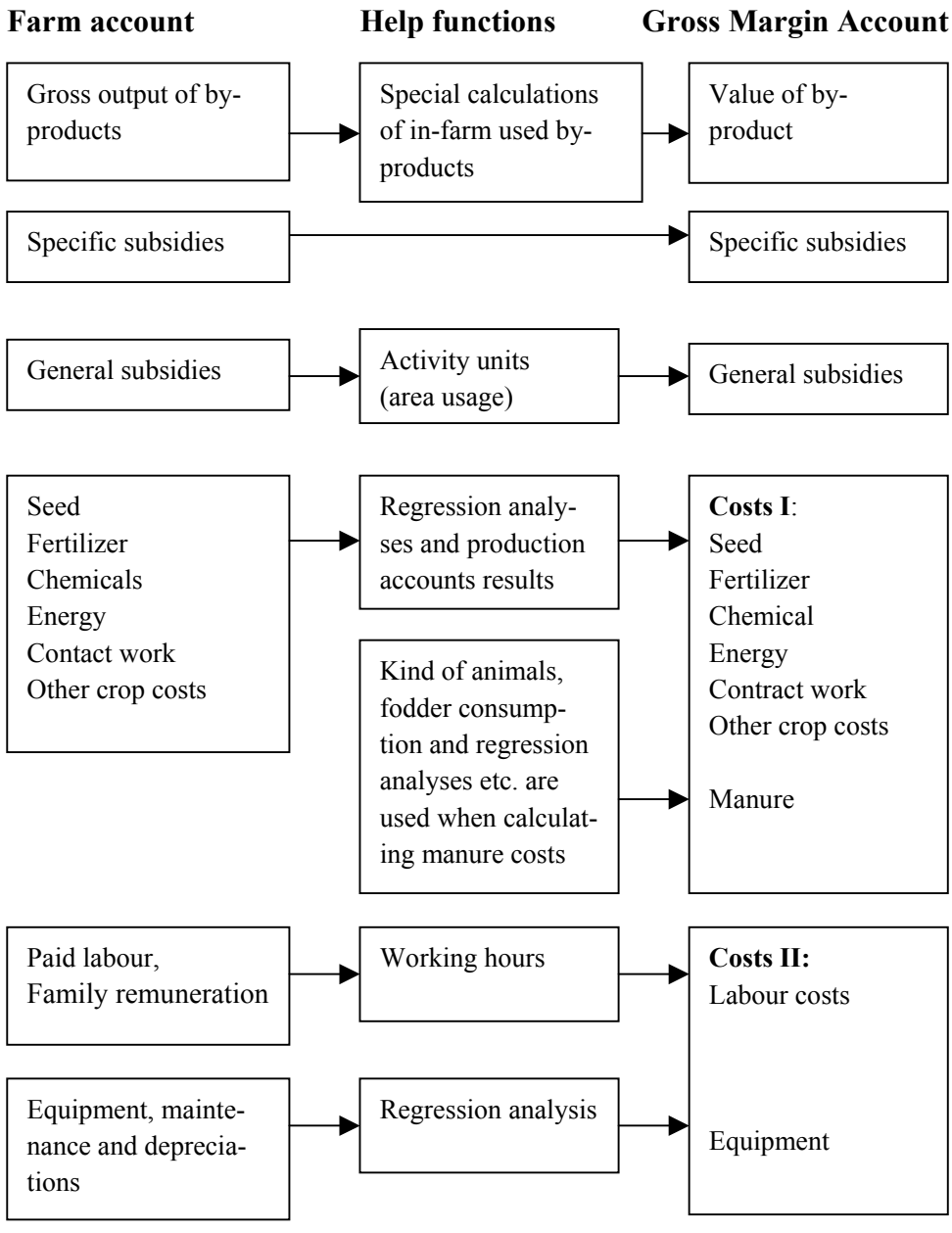
3. Column three contains information transferred to a Gross Margin Account at activity level.

Arrows directly from column one to three indicate that no conversion has taking place. Arrows from column one to three through a box in column two indicate that some distributing calculations are needed. Boxes in column two and no box in column one means that new information is generated at farm level from the external statistical sources.

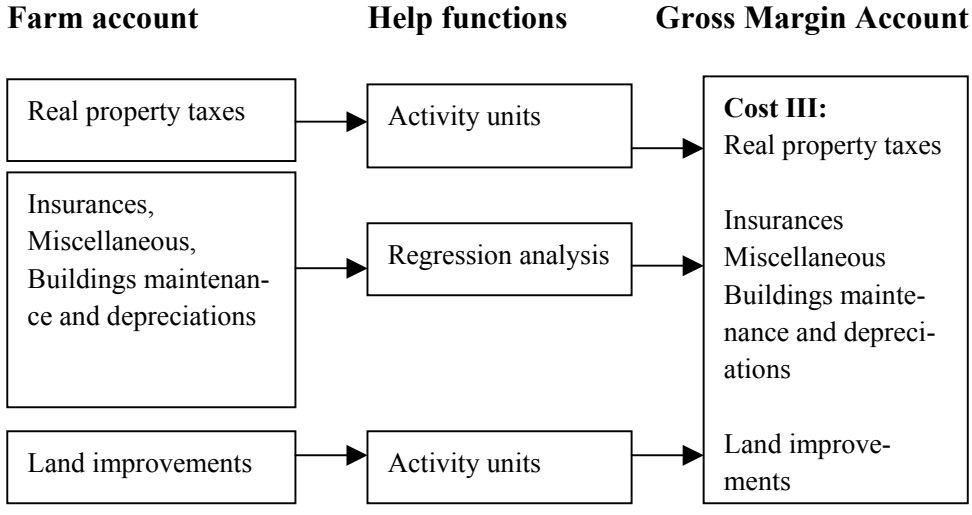
Calculation overview for crop activities



Calculation overview for crop activities, continued



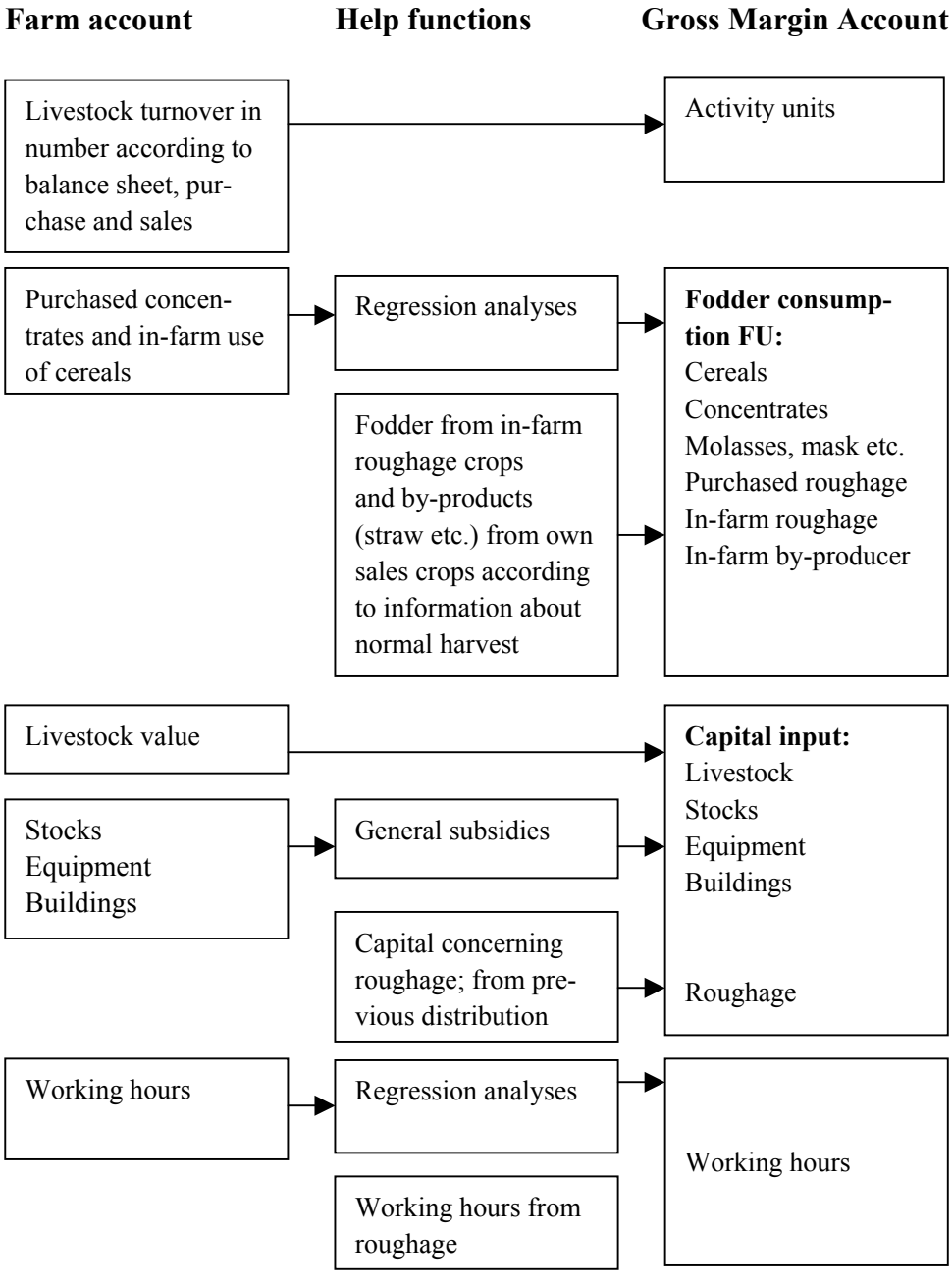
Calculation overview for crop activities, continued



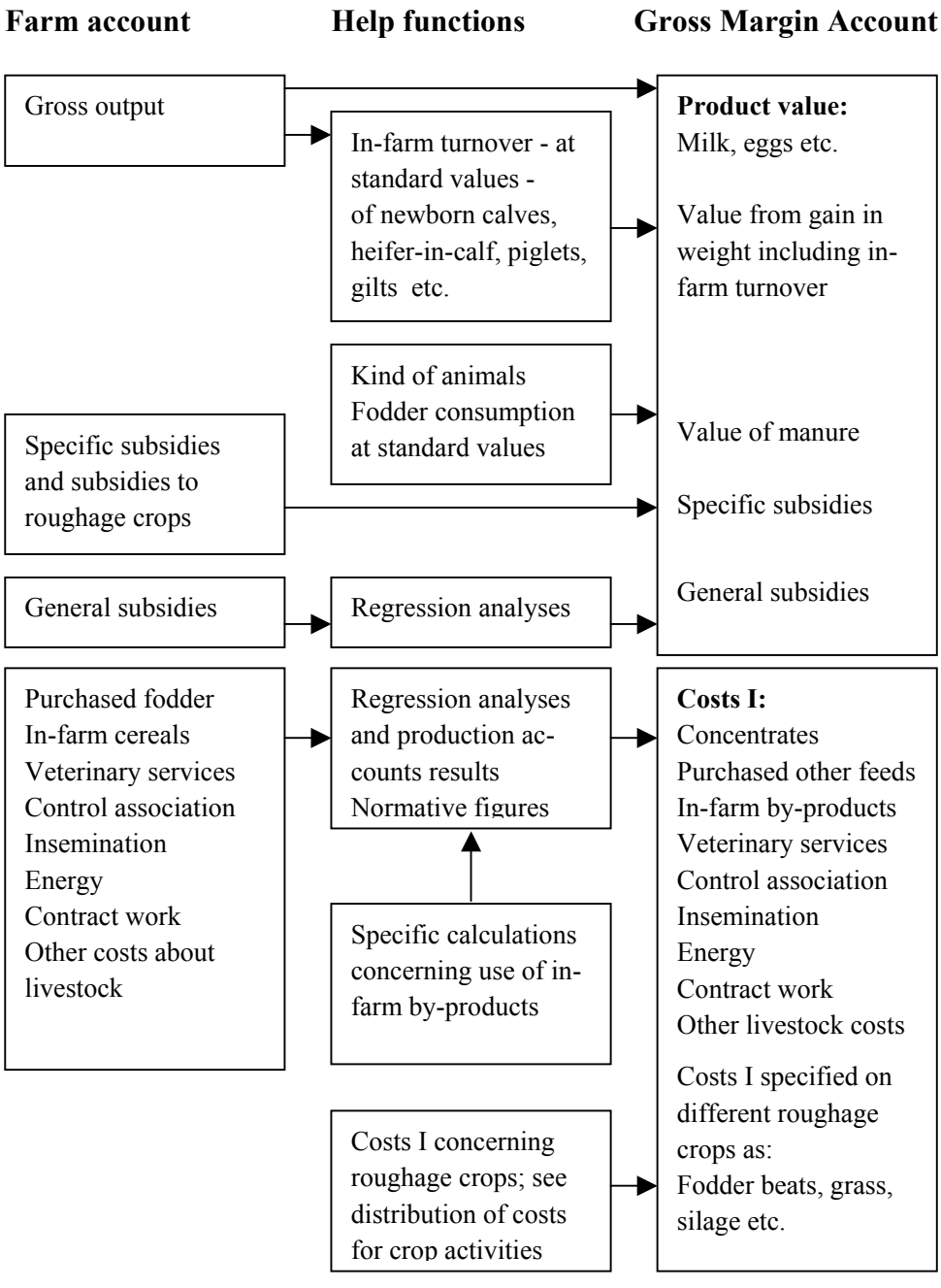
Please note that a product value has not been calculated for crops with roughage. Capital input, costs and possible subsidies are distributed to livestock activities, where the roughages are used. Keys figures for the distribution are the amount of consumed FU.

Later on - in the SGM context, chapter 5 – the roughage harvest is valued at an imaginary price of DKK 0,95 per FU. This price is almost equivalent to the value of one FU in barley.

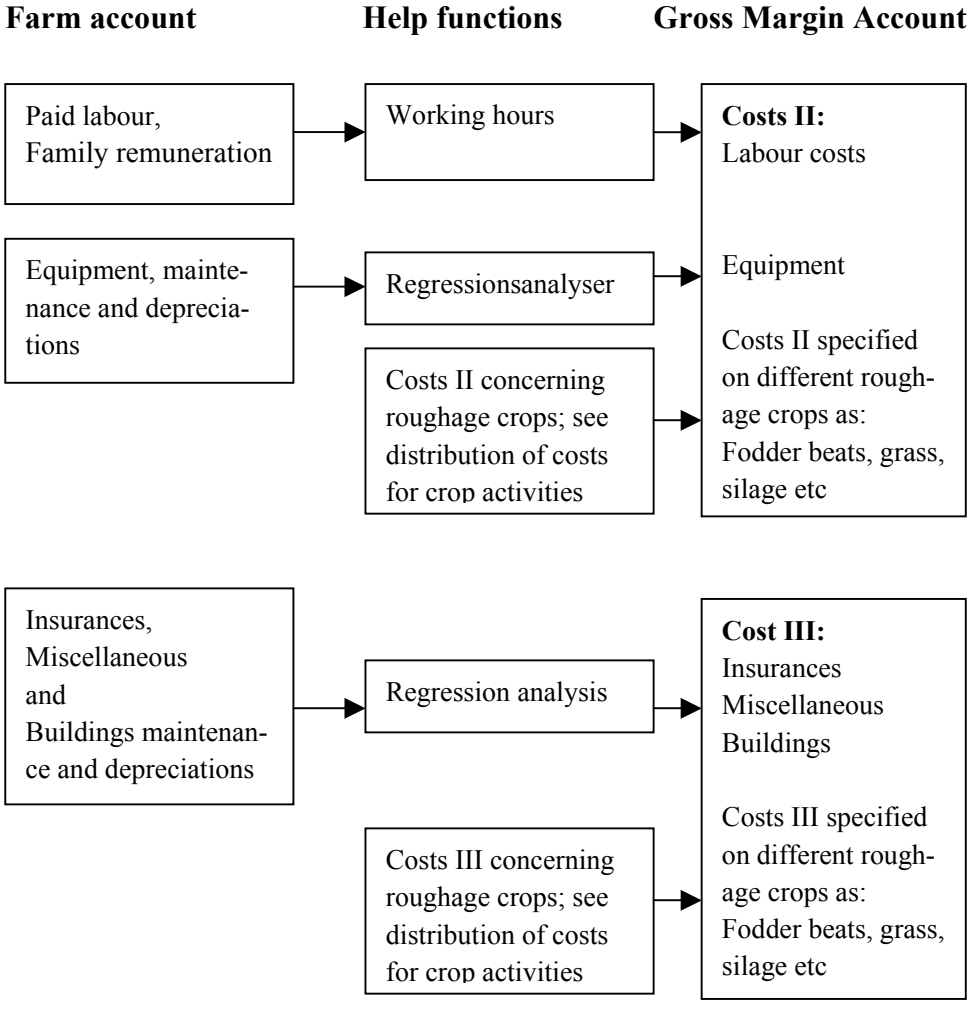
Calculation overview for livestock activities



Calculation overview for livestock activities, continued



Calculation overview for livestock activities, continued



ANNEX V.

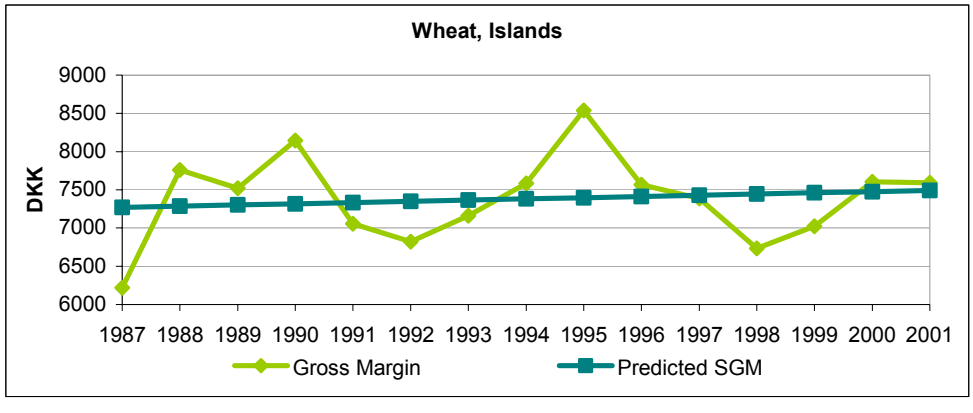
Tables with some important SGM activities
With results from the latest 15 years

Results from all activities are available on homepage:

http://www.foi.dk/data/Baggrundspapirer/SGM2000.xls

SGM calculation for wheat, Islands

	3 year average	2001	2000	1999	1998	1997	1996	1995
Gross output per ha								
Compensatory payment	2289	2419	2283	2164	2200	2137	2165	2159
Quantity, hkg	80,27	81,00	81,30	78,50	77,70	75,60	73,40	79,80
Price per hkg, DKK	81,03	81,89	81,29	79,86	77,34	88,17	92,86	97,04
Value per ha , DKK	6504	6633	6609	6269	6009	6666	6816	7744
Byproduct- straw, DKK	441	469	433	421	388	366	359	409
Total output, DKK./ha	9233	9521	9325	8854	8597	9169	9340	10312
Specific costs per ha								
Seeds, DKK	381	384	378	382	401	421	400	407
Fertilizers, DKK	650	754	581	616	705	733	752	767
Crop protection, DKK	679	652	660	725	639	547	539	526
Miscellaneous, DKK	116	138	101	109	118	80	80	72
Total costs, DKK per ha	1827	1928	1720	1832	1863	1781	1771	1772
SGM, DKK per ha	**7407**	**7593**	**7605**	**7022**	**6734**	**7388**	**7569**	**8540**
Predicted values		7492	7476	7460	7444	7429	7413	7397
Intercept	7254,11							
x-coefficient	1586							
Estimat SGM2000, DKK	**7476**							

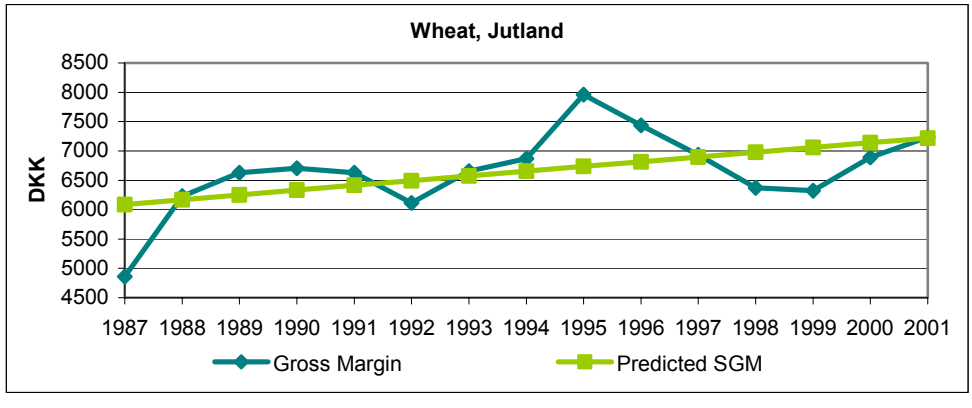


SGM calculation for wheat, Islands, continued

1995	1994	1993	1992	1991	1990	1989	1988	1987
2159	1654	1043	0	0	0	0	0	0
79,80	73,30	76,00	66,90	73,20	82,20	71,73	70,03	58,37
97,04	99,22	98,33	127,01	122,64	123,20	132,03	138,75	143,11
7744	7273	7473	8497	8977	10127	9470	9717	8354
409	435	458	390	386	330	497	483	414
10312	9362	8974	8887	9363	10457	9967	10200	8768
407	429	428	492	480	500	522	522	547
767	723	708	817	940	888	990	990	978
526	549	588	688	791	849	759	759	754
72	76	91	68	97	73	176	169	273
1772	1777	1815	2065	2308	2310	2447	2440	2552
8540	**7585**	**7159**	**6822**	**7055**	**8147**	**7520**	**7760**	**6216**
7397	7381	7365	7349	7333	7318	7302	7286	7270

SGM calculation for wheat, Jutland

	3 year average	2001	2000	1999	1998	1997	1996	1995
Gross output per ha								
Compensatory payment	2294	2433	2269	2180	2195	2171	2191	2190
Quantity, hkg	68	71,40	69,60	63,50	67,90	67,50	66,70	70,40
Price per hkg, DKK	85	85,91	83,46	84,28	81,00	89,97	98,11	99,60
Value per ha , DKK	5765	6134	5809	5352	5500	6073	6544	7012
Byproduct- straw, DKK	492	501	480	494	451	446	439	512
Total output, DKK./ha	8551	9068	8558	8026	8146	8690	9174	9714
Specific costs per ha								
Seeds, DKK	389	402	385	381	397	404	405	428
Fertilizers, DKK	570	655	514	542	627	687	694	704
Crop protection, DKK	647	644	641	655	615	574	543	528
Miscellaneous, DKK	129	135	126	127	137	93	97	92
Total costs, DKK per ha	1736	1836	1666	1705	1776	1758	1739	1752
SGM, DKK per ha	**6815**	**7232**	**6892**	**6321**	**6370**	**6932**	**7435**	**7962**
Predicted values		7220	7139	7058	6978	6897	6817	6736
Intercept	6010							
X-coefficient	81							
Estimat SGM2000, DKK	**7139**							

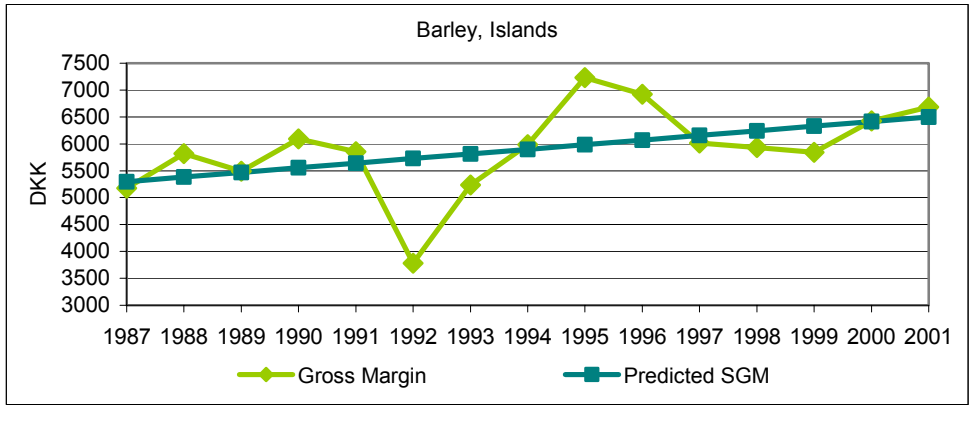


SGM calculation for wheat, Jutland, continued

1994	1993	1992	1991	1990	1989	1988	1987
1662	1096	0	0	0	0	0	0
64,00	68,20	60,10	68,40	70,00	66,39	59,82	49,55
99,78	100,19	126,36	123,58	122,33	127,15	135,17	136,75
6386	6833	7594	8453	8563	8441	8086	6776
594	583	496	434	368	674	623	611
8642	8512	8090	8887	8931	9115	8709	7387
426	454	476	490	477	569	569	572
707	722	765	894	863	977	977	1015
541	591	664	744	790	743	743	683
97	92	71	132	98	200	192	255
1771	1859	1976	2260	2228	2489	2481	2525
6871	**6653**	**6114**	**6627**	**6703**	**6626**	**6228**	**4862**
6655	6575	6494	6413	6333	6252	6171	6091

SGM calculation for barley, Islands

	3 year average	2001	2000	1999	1998	1997	1996	1995
Gross output per ha								
Compensatory payment	2290	2422	2283	2166	2170	2109	2137	2124
Quantity, hkg	59,56	61,38	60,14	57,16	57,67	57,9	59,98	58,29
Price per hkg, DKK	88,39	90,42	88,04	86,56	88,57	93,57	101,54	110,27
Value per ha , DKK	5264	5550	5295	4948	5108	5418	6090	6427
Byproduct- straw, DKK	321	349	315	299	312	239	267	263
Total output, DKK./ha	7876	8321	7893	7413	7590	7766	8494	8814
Specific costs per ha								
Seeds, DKK	438	444	430	441	460	436	445	450
Fertilizers, DKK	607	691	554	576	640	700	689	694
Crop protection, DKK	385	364	371	420	408	347	357	356
Miscellaneous, DKK	127	138	112	132	148	270	83	81
Total costs, DKK per ha	1558	1637	1467	1569	16569	1753	1574	1581
SGM, DKK per ha	**6318**	**6684**	**6426**	**5844**	**5934**	**6013**	**6920**	**7233**
Predicted values		6501	6415	6329	6243	6157	6071	5985
Intercept	5211							
X-coefficient	86,00							
Estimat SGM2000, DKK	**6415**							

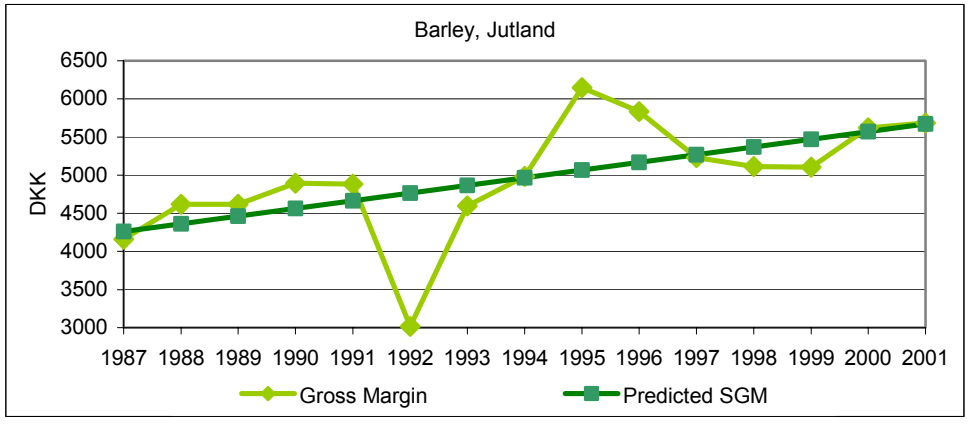


SGM calculation for barley, Islands, continued

1994	1993	1992	1991	1990	1989	1988	1987
1627	1017						
54,18	53,71	40,19	57,81	59,61	49,32	50,59	46,17
107,81	103,83	128,67	125,79	126,58	135,55	139,56	144,64
5841	5576	5171	7272	7546	6685	7060	6678
278	232	197	255	205	497	483	414
7746	6825	5368	7527	7751	7182	7543	7092
441	469	460	409	424	440	478	479
670	683	690	802	777	686	686	748
360	339	367	353	356	408	408	468
288	96	72	110	98	159	153	219
1759	1587	1589	1674	1655	1693	1725	1914
5987	**5238**	**3778**	**5852**	**6096**	**5489**	**5818**	**5178**
5899	5813	5727	5641	5555	5469	5383	5297

SGM calculation for barley, Jutland

	3 year average	2001	2000	1999	1998	1997	1996	1995
Gross output per ha								
Compensatory payment	2316	2451	2301	2196	2210	2162	2171	2180
Quantity, hkg	49	49,74	49,69	46,31	48,91	48,81	48,84	50,30
Price per hkg, DKK	87	88,20	86,36	85,32	83,46	91,96	99,58	101,85
Value per ha , DKK	4210	4387	4291	3951	4082	4488	4863	5123
Byproduct- straw, DKK	387	381	387	392	379	354	360	427
Total output, DKK./ha	6912	7219	6979	6539	6671	7004	7394	7730
Specific costs per ha								
Seeds, DKK	424	435	420	417	420	428	429	452
Fertilizers, DKK	534	603	476	524	619	671	701	712
Crop protection, DKK	348	356	343	345	369	337	330	319
Miscellaneous, DKK	137	143	122	147	151	340	102	98
Total costs, DKK per ha	1444	1537	1361	1433	1560	1776	1562	1581
SGM, DKK per ha	**5469**	**5682**	**5618**	**5106**	**5111**	**5228**	**5832**	**6149**
Predicted values		5671	5570	5470	5369	5269	5168	5067
Intercept	4162							
X-coefficient	101							
Estimat SGM2000, DKK	**5570**							

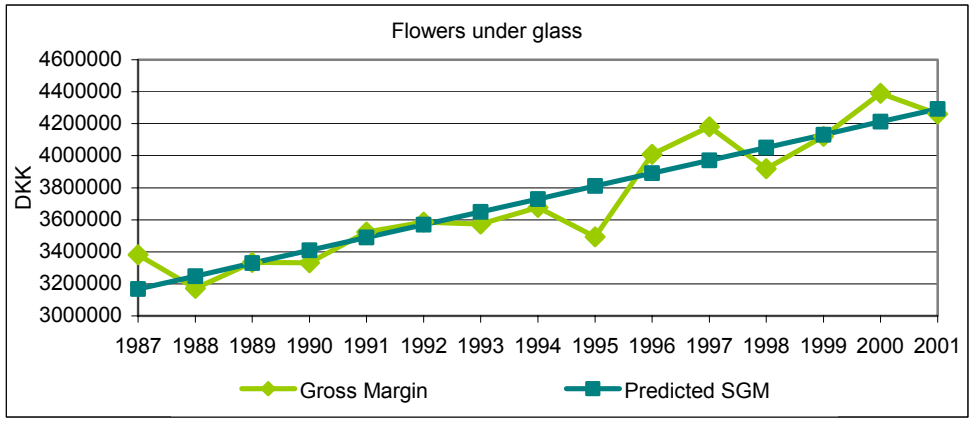


SGM calculation for barley, Jutland, continued

1994	1993	1992	1991	1990	1989	1988	1987
1647	1078						
46,95	45,71	33,65	50,45	50,70	44,52	44,96	40,75
100,45	102,85	125,32	122,50	122,75	131,31	132,26	134,11
4716	4701	4218	6180	6224	5845	5946	5465
432	414	292	369	324	674	567	600
6795	6193	4510	6549	6548	6519	6513	6065
414	457	414	399	393	416	499	462
702	716	680	796	829	733	819	836
343	320	318	303	313	366	360	375
352	101	79	166	120	183	218	210
1811	1594	1491	1664	1655	1698	1896	1883
4984	**4599**	**3018**	**4884**	**4893**	**4617**	**4617**	**4162**
4967	4866	4765	4665	4564	4464	4363	4262

SGM calculation for flowers under glas

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per farm							
Ha pr holding							
flowers	0,67	0,7024	0,6712	0,6414	0,6047	0,573	0,5568
estimated adjustment	-0,01	-0,0091	-0,0123	-0,0104	-0,0076	-0,0026	-0,0072
Gross output per farm							
flowers	4550369	4841114	4653568	4156426	3818569	3856428	3574660
estimated adjustment	0	0	0	0	0	0	0
Total output, kr./ha	6883409	6982712	7062631	6587150	6395193	6760919	6504112
Specific costs per ha							
Seeds, DDK	902655	951213	934440	822313	928992	1003001	914588
Fertilizers, DKK	286661	278860	289851	291273	268963	252020	256657
Crop protection, DKK	82600	83013	85497	79289	81633	74751	61119
Miscellaneous, DDK	1348694	1409743	1363290	1273050	1195958	1249855	1263549
Total costs, kr. per ha	2620611	2722829	2673077	2465925	2475547	2579627	2495913
SGM, DKK per ha	**4262798**	**4259882**	**4389554**	**4121224**	**3919646**	**4181292**	**4008199**
Predicted values		4292101	4211812	4131524	4051235	3970947	3890659
Intercept	3087774						
X-coefficient	80288						
Estimat SGM2000, DKK	**4211812**						

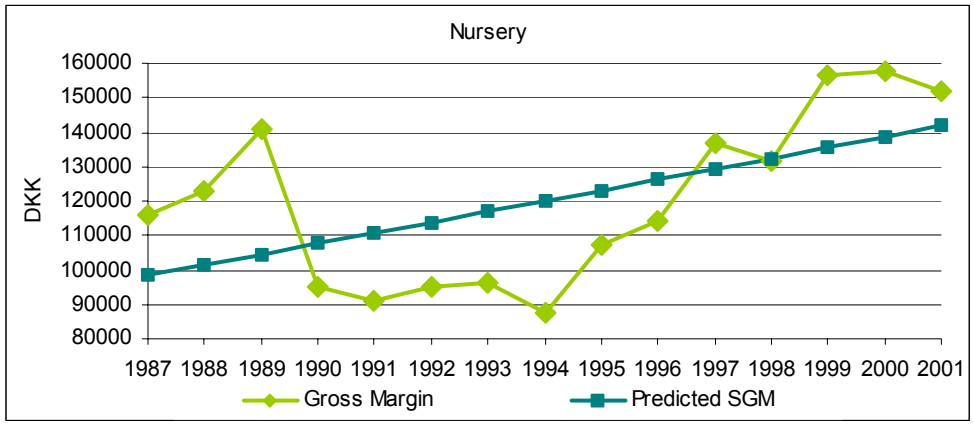


SGM calculation for flowers under glas, continued

1995	1994	1993	1992	1991	1990	1989	1988	1987
0,5213	0,5163	0,5233	0,5088	0,1385	0,1438	0,1321	0,1321	0,1135
0,0100	0,0000	0,0000	0,0000	-0,0104	-0,0082	-0,0057	-0,0057	0,0000
3067916	3092832	3100163	3074252	911585	948287	859277	859277	778336
0	0	0	0	0	-11552	0	0	
5774357	5990378	5924256	6042162	7116198	6908075	6798078	6798078	6859445
853910	995875	989764	1009155	917814	891361	982824	1005937	915800
258734	264339	264163	255337	268896	264189	228732	229631	218281
61823	60722	54892	70568	54445	57448	52000	56378	57165
1106680	993127	1100772	1120836	2351726	2364156	2199148	2258981	2285982
2281148	2314063	2409591	2455896	3592881	3577154	3462704	3550927	3477229
3493209	**3676315**	**3574193**	**3585829**	**3523317**	**3330921**	**3333653**	**3171777**	**3382216**
3810370	3730082	3649793	3569505	3489216	3408928	3328640	3248351	3168063

SGM calculation for nursery

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per farm							
Ha pr holding							
nursery	11,69	12,64	11,73	10,71	11,29	10,86	11,04
estimated adjustment	-0,22	-0,15	-0,23	-0,27	-0,02	-0,35	0,30
Gross output per farm							
nursery	2426015	2631037	2460876	2186131	2091794	1959794	1716253
Total output, kr./ha	211396	210682	214019	209361	185675	186469	151345
Specific costs per ha							
Seeds, DKK	35034	36657	35348	33095	34072	28906	24136
Fertilizers, DKK	6720	6191	7017	6953	5926	6965	4419
Crop protection, DKK	2271	2265	2370	2178	2118	2492	1977
Miscellaneous, DKK	12043	13778	11780	10573	11883	11462	6737
Total costs, DKK per ha	56068	58890	56516	52798	54000	49825	37269
SGM, DKK per ha	**155328**	**151792**	**157503**	**156563**	**131675**	**136644**	**114076**
Predicted values		141744	138640	135536	132432	129328	126224
Intercept	95184,80						
X-coefficient	3103,95						
Estimat SGM2000, DKK	**138640**						

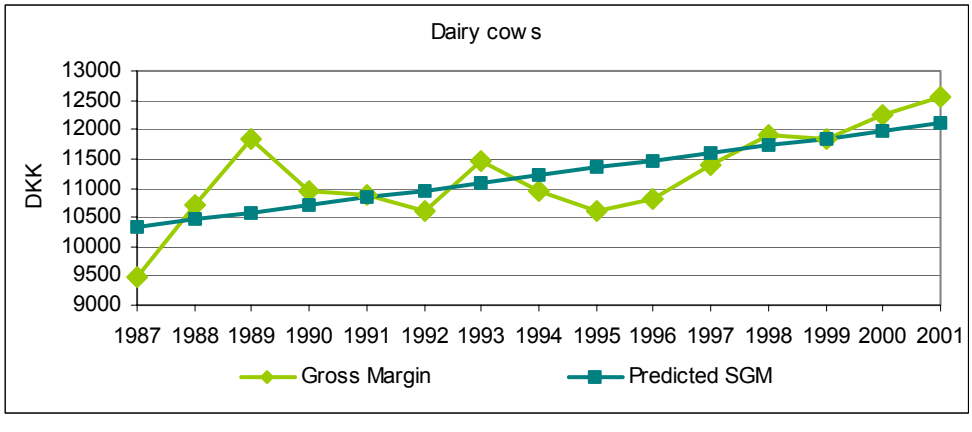


SGM calculation for nursery, continued

1995	1994	1993	1992	1991	1990	1989	1988	1987
1,56	1,52	1,25	10,31	1,32	1,41	1,30	1,41	1,40
0,00	0,00	0,00	0,00	0,00	0,00	0,05	0,00	0,00
228853	200014	170984	1447022	171276	179579	240359	234119	226397
146823	131588	136787	140351	129902	127687	177886	165549	161578
28130	32064	30115	30606	32542	23753	18437	26946	23420
3587	3871	4373	4091	2831	3023	5350	4672	5410
1916	1448	1961	2186	1493	1632	2546	2009	1554
5734	6679	4184	8111	2290	3979	10952	9084	15164
39367	44062	40633	44994	39156	32387	37285	42711	45567
107455	**87526**	**95976**	**95358**	**90747**	**95300**	**140602**	**122838**	**116191**
123120	120016	116912	113808	110705	107601	104497	101393	98289

SGM calculation for dairy cows

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per cow							
Increase of meat							
Quantity, heads	0,40	0,37	0,42	0,40	0,41	0,42	0,43
Price per head, DKK	3119	2820	3299	3208	3350	3412	3415
Value, DKK	1246	1049	1392	1296	1360	1433	1472
Other main produkt, milk							
Quantity, kg	7334	7403	7296	7304	7111	6964	6761
DKK pr kg	2,38	2,47	2,36	2,31	2,40	2,38	2,37
Value, DKK	17460	18268	17230	16883	17065	16591	16045
Byproduct, new born calves							
Quantity, heads	1	1	1	1	1	1,05	1,07
Price per head, DKK	757	682	795	793	822	714	678
Value, DKK	771	687	822	803	838	749	728
Compensatory payment	68	135	70	0	0	35	48
Total output, DKK per cow	19545	20139	19514	18982	19263	18808	18293
Specific costs per cow							
Replacement							
Quantity, heads	0,40	0,37	0,42	0,40	0,41	0,42	0,43
Price per head, DKK	5974	5965	5934	6025	6165	5869	6009
Value, DKK	2386	2219	2504	2434	2503	2465	2590
Variable costs							
Concentrat feed stuffs, DKK	3118	3432	2999	2924	3063	3197	3158
Coarse fodder, DKK	798	820	770	805	852	834	884
Miscellaneous, DKK	1034	1106	1002	995	929	912	840
Total costs per cow	7337	7577	7275	7158	7347	7408	7472
SGM, DKK per cow	**12208**	**12562**	**12239**	**11824**	**11916**	**11400**	**10821**
Predicted values		12107	11980	11853	11726	11599	11472
Intercept	10202,28						
X-coefficient	126,96						
Estimat SGM2000, DKK	**11980**						

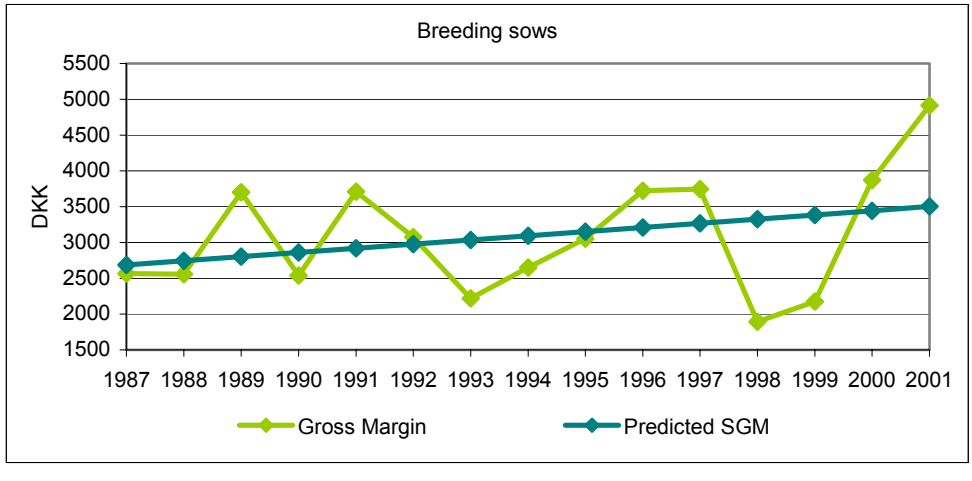


SGM calculation for dairy cows, continued

1995	1994	1993	1992	1991	1990	1989	1988	1987
0,41	0,42	0,42	0,45	0,47	0,43	0,43	0,46	0,47
4184	4512	4592	4627	4596	4369	5637	5526	5797
1707	1904	1947	2073	2160	1870	2397	2505	2725
6678	6661	6683	6326	6135	5998	5980	5912	5712
2,35	2,42	2,47	2,54	2,58	2,61	2,84	2,65	2,47
15725	16135	16512	16062	15823	15634	16990	15652	14108
1,07	1,04	1,04	1,05	1,02	1,15	1,14	1,11	1,07
824	942	907	888	955	1062	1286	1169	1125
878	978	945	931	976	1218	1466	1298	1204
18310	19017	19404	19066	18959	18722	20853	19455	18037
0,41	0,42	0,42	0,45	0,47	0,43	0,43	0,46	0,47
6522	6863	6776	6569	6517	6437	7593	7163	6804
2661	2896	2873	2943	3063	2755	3265	3295	3198
3262	3341	3198	3394	3034	3168	4006	3731	3596
902	974	1053	1276	1171	1077	980	959	1063
871	868	819	836	799	774	777	747	690
7696	8079	7943	8449	8067	7774	9028	8732	8547
10614	**10938**	**11461**	**10617**	**10892**	**10948**	**11825**	**10723**	**9490**
11345	11218	11091	10964	10837	10710	10583	10456	10329

SGM calculation for breeding sows

	3 year average	2001	2000	1999	1998	1997	1996
Gross output per pig							
Increase of meat							
Quantity, heads	0,62	0,63	0,62	0,62	0,60	0,63	0,60
Price per head, DKK	1123	1307	1187	873	805	1315	1305
Value, DKK	699	818	737	541	486	828	777
Main produkt, piglets							
Quantity, heads	21,58	21,79	21,59	21,35	20,96	20,02	20,06
DKK per head	324	392	333	246	247	351	347
Value, DKK	6996	8550	7178	5261	5188	7024	6961
Total output, DKK per head	7695	9368	7915	5802	5674	7852	7738
Specific costs per pig							
Replacement							
Quantity, heads	0,62	0,63	0,62	0,62	0,60	0,63	0,60
Price per head, DKK	1256	1431	1263	1075	1093	1472	1495
Value, DKK	782	895	784	666	660	927	890
Variable costs							
Concentrat feedstuffs, DKK	2713	2933	2705	2500	2648	2650	2653
Coarse fodder, DKK	33	39	34	26	24	21	12
Miscellaneous, DKK	514	587	519	436	446	508	458
Total costs per sow	4042	4454	4043	3628	3778	4106	4013
SGM, DKK per sow	**3654**	**4915**	**3872**	**2174**	**1896**	**3746**	**3725**
Predicted values		3502	3444	3385	3327	3268	3210
Intercept	2624,99						
X-coefficient	58,49						
Estimate SGM2000, DKK	**3444**						



SGM calculation for breeding sows, continued

1995	1994	1993	1992	1991	1990	1989	1988
0,63	0,59	0,58	0,57	0,57	0,51	0,56	0,51
1055	980	1059	1308	1597	1467	1341	1275
660	574	614	744	918	745	751	650
20,26	20,28	20,02	19,53	19,20	18,43	19,20	19,40
311	292	260	340	339	301	379	312
6303	5913	5195	6647	6514	5540	7278	6050
6963	6487	5809	7391	7432	6285	8029	6700
0,63	0,59	0,58	0,57	0,57	0,51	0,56	0,51
1353	1284	1223	1586	1533	1400	1241	1239
847	752	709	902	881	711	695	632
2604	2614	2437	2985	2427	2644	3165	3070
19	16	16	9	3	0	0	0
440	457	428	419	412	391	469	442
3910	3839	3590	4315	3723	3746	4329	4144
3053	**2648**	**2219**	**3076**	**3709**	**2539**	**3700**	**2556**
3151	3093	3034	2976	2917	2859	2800	2742

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