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Phasing out milk quotas: Possible impacts on German Agriculture

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Phasing out Milk Quotas – Possible Impacts on German Agriculture

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Introduction

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1 Introduction

Until a few years ago the continuation of the quota regime for milk was not questioned. However, during the negotiations for 'Agenda 2000' four EU-member states declared their opposition to the continuation of the milk quota regime. They wanted to prevent the prolongation of the quota regime due for the year 2000 using their blocking minority power, unless a clear indication for an abolishment of the quota regime. This led to a decision for the mid-term review of 'Agenda 2000', according to which the milk quota regime shall be reviewed aiming at the abolishment of the quota regime after 2006. United Kingdom, Sweden, Denmark and The Netherlands have established a working group called 'CAPRI'. This working group shall work out suggestions for reforms in the milk market policy.

Considering the need for a political decision on this issue, the FAL working group '*Model supported assessment of policy impacts'* took up the topic *'Exit from the milk quota regime'* at the beginning of the year 2001. With the available farm, regional and market models, the effects of an abolishment of the milk quota regime were to be analysed. In accordance with the results of discussions with experts, 2008 has been assumed as the year of abolishing the quota regime. With an earlier introduction of the milk market reform, a transitional period could be used to aim at this objective.

As a pre-requisite for an abolishment of the quota regime it is assumed that price reductions are combined with direct payments to reduce loss of income due to lower outputs. The question is highlighted: what kind of supply and demand effects are to be expected with which price changes in conjunction with direct payments linked to production or decoupled, and where could the market equilibrium appear. In spite of the empirical foundation, the result is influenced by numerous assumptions, especially the adjustments on the farm level (supply function). Therefore it is being attempted to isolate the effects of specific policy instruments and of the range of appropriate parameter constellations.

The economic impacts, the alteration in the rent of producers and consumers and also the public expenses (direct payments and export subsidies) are to be considered. Due to the lack of sufficient data, the quota rent can be depicted only in a simplified manner. In the market-model 'GAPsi', the rent of milk quotas has been exogenously given by the definition of the supply function. In 'TIPI-CAL', the actual quota costs of examined typical holdings have been considered. In 'BEMO' and 'FARMIS', conclusions are drawn from the dual values of the milk quota. In an excursions on milk quota trade, equilibrium prices for the milk quota are determined. Furthermore, it has been attempted to assess the repartition of income effects between tenants and lessors of milk quota.

The determination of the structural adjustments due to changes in the milk market policy is a methodical problem. This regards the impact of the quota trade in the transitional period, and especially the situation after the abolition of the milk quota regime. The milk

quota regime has substantially hampered structural adjustments. With the help of models it is attempted to estimate the competitiveness of milk production without the milk quota regime to draw conclusions on the growth of farm holdings.

The study is sub-divided as follows. In Chapter 2 models and database as well as scenario assumptions are described. In Chapters 3 to 6, the results are discussed differentiated into market, sectoral, regional and farm level. In Chapter 7, a comprehensive assessment of all model results is carried out.

2 Models, data and scenarios

The system of complementary models of FAL was used for the analysis:

- GAPsi and MIPsi are partial equilibrium market models, which are used for the definition of scenario conditions and the estimation of supply and demand effects for the EU
- RAUMIS is a regional differentiated sector model, which is used for the assessment of the regional consequences in Germany
- FARMIS is a farm group model for the German agricultural sector, which is used for the analysis at sector level and by farm groups of different types and sizes
- BEMO is an optimisation model for representative farms, which is used for the analysis of distribution effects and impacts of quota trade: it is further used to assess different specifications of policy instruments
- TIPI-CAL is used for the analysis of income effects and the evaluation of growth potentials for three typical dairy farms

The main features and model specifications related to the subject of the study are described in the following.

2.1 Market models GAPsi and MIPsi

For the analysis of the market effects from an abolition of the milk quota regime, the partial equilibrium models GAPsi and MIPsi have been used.[1] Both models are based on the principle of global market equilibrium. That is, first, of every agricultural product and in a world wide context, it is just as much consumed as is produced and, second, the markets of all regions are, subject to the influences of agricultural and commercial policy measures, related to each other through the world market prices of products. Both models include the same regions (EU member states, regions outside the EU). Both models are running through the same period of time (1997 to 2008), with the results of any single year being based on the results of the preceding year. The same models are used for making projections and for the analysis of the scenarios, so that eventual methodological breaks between the different approaches are avoided.

In spite of a common basis, the models differ fundamentally. Whereas in GAPsi raw milk is considered to be one agricultural product among others and also to be demanded for,

[1] The models have been developed for simulating the effects of alternative policy measures under the Common Agricultural Policy (GAPsi) and the EU milk policy (MIPsi), respectively.

traded and consumed as such (i. e. as raw milk, unprocessed), MIPsi is specialized in the milk sector depicting the technical and economic relations, which are given in milk processing and are established between the production of raw milk and the consumption of milk products. Contrary to GAPsi, MIPsi also allows to disclose changes in prices and quantities of individual milk products and to assess the effects of product specific restrictions (as e. g. in foreign trade). With regard to the information on the effects of abolishing the milk quotas to be gained, the two models mutually complement each other.

In **GAPsi**, milk is one agricultural product amongst twelve others. As in this partial model neither the demand of milk production on fodder areas nor specific requirements of farming upon labour, land and capital is considered, there is hardly any relationship between milk and other products with regard to production and consumption. Basically, the only relation between milk production and other animal or crop productions is through the supply and, respectively, the requirements of concentrated feed; even the cross price elasticity of the demand for milk relative to other foodstuffs is assumed to be zero. Because of these model characteristics one must not expect that for the examined scenarios, GAPsi will identify salient price or quantity effects of changing milk policy measures on other agricultural produce as e. g. crop products or pork. Even the evidence made by the model with regard to beef production, which may be considered to be dependent on the number of calves delivered by dairy cows, must remain weak because average slaughter weight and specialized beef cows affect beef production.

The speciality of **MIPsi** lies in explicitly modelling milk processing, i. e. raw milk produced on farms yields defined quantities of milk fat and protein from which five final products (fresh milk products, butter, cheese, skimmed milk powder and other milk products) are made. The fat and protein contents in these products are, however, not fixed but can vary depending on the prices of both, the components and the final products.[2] Trade and consumption are in these five products. Hence, not only different price and quantity developments can be seized but also specific policy directions (export subsidies, WTO restrictions) can be considered. A further advantage of this model is that the market prices for milk fat and protein are actually computed from the intervention prices for butter and skimmed milk powder and the producer prices of raw milk are corresponding to the valuation of milk fat and protein in the final dairy products.

[2] On the whole, the five groups of milk products named above as final products may show (temporal and regional) fluctuations in their fat and protein content which widely surpass any measure which can realistically be assumed. However, such wide fluctuations are nevertheless meaningful if a changing composition of the product groups is thought of: The shares of products with high (low) fat and, respectively, protein content may vary in much wider proportions than the recipes of individual products may suggest.

2.2 The agricultural sector model RAUMIS

The agricultural sector model RAUMIS represents the entire German agricultural sector, defined according to the national agricultural accounts, and regionalised on the county level. The data source consists of the regional agricultural statistics on land use, yields, animal husbandry and milk production per cow, farm sizes and structure of livestock farms. In addition, normative data is used for the determination of input/output coefficients of the production activities and data of the national agricultural accounts. In a 'top-down' procedure, extent of production and input/output coefficients of the production activities are adjusted to the frame data of the national accounts. Thereby, the regional representation is consistent to the sectoral data.

RAUMIS is used as an information system for ex-post analyses. For ex-ante analyses, a comparative-static optimisation model is used. The unit to be optimised is the 'regional farm', an individual holding representing the entire regional agricultural land use. Adjustments to changes of basic conditions tend to be overestimated by the aggregation to the regional farm, since farm specific restrictions existing in reality or transaction costs occurring between holdings are not included in the model. Therefore, changes of production determined in model calculations have to be understood as developments to be expected in the long run. By the detailed representation of regional land use, yields, and the farm structures, RAUMIS allows for an analysis of regional production potentials. Since RAUMIS represents the entire agricultural sector, the compliance with national ceilings, e. g. for beef payments, and the balance between supply and demand of young livestock can be assured. This is of importance in particular for the prediction of beef production.

Agricultural production is depicted in a process analysis approach by 30 main activities of crop production and 15 activities of animal production. For the update of coefficients, the definition of the optimisation problem, the model calibration and simulation, the same approach is used as described for the farm group model FARMIS (see Chapter 2.3). The two models are similarly structured and use comparable normative data and modules (Jacobs, 1998). Because of the methodical similarity, RAUMIS and FARMIS are suitable for a parallel use in the assessment of policy impacts and the comparative interpretation of the model results. The difference between the two models is that they use different data sources (agricultural statistics and national agricultural accounts versus farm accounting data) and accentuate different restrictions (regional/site specific versus farm specific).

For the calculations, the model RAUMIS was updated on basis of the data of the agriculture census in 1999. Furthermore, the representation of fodder requirements was improved in particular for ruminants. The grassland use was complemented by different production intensities, including an option for extensive grassland with area payments according to agri-environment programmes. For the modelling of this activity, regional

data on grassland extensification, supported by agri-environmental programmes according to Regulation (EEC) 2078/92 in the year 1998, are used.

2.3 Model specification of FARMIS

The farm group model FARMIS is a comparative-static process-analytical programming model for the German agricultural sector, which is used for simulation of policy alternatives (ex-ante-analysis). In contrast to the farm model BEMO, the optimisation is done for farm groups rather than individual farms. In accordance with the statistical frame data used for the estimation of improved aggregation factors, the standard stratification criteria for the establishment of farm groups are region (Laender), farm type and standard farm income. The use of farm groups instead of single farms allows a better manageability of the model. Other reasons are confidentiality of individual farm data and the reduction of errors in the accounting data. Due to inconsistent data, the use of single farm data would result in a high variance of estimated input/output coefficients between the farms. The impact of data errors is reduced by using average data of two years and the aggregation of single farm data to homogenous farms groups.

The data base of the farm group model FARMIS is primarily represented by national FADN[3] data which are placed at the disposal of FAL.These national FADN data are surveyed once a year and include farm accounting data of about 11.000 farms with roughly 8.500 different variables. For western Germany, the sample contains farms in hand of natural persons with a minimum standard gross margin of € 7669 while for the new Laender farms run by legal persons are also included.

For the modelling process the accounting data of the financial years 1995/96 and 1996/97 are used. These data are supplemented by technical coefficients, that are taken from various publications of KTBL[4] or are based on expert knowledge. As a significant characteristic of FARMIS it is to be emphasised, that the input/output coefficients which are determined for groups of farms are consistent with the respective farm accounts.

In order to aggregate the national FADN data to sectoral accounts, a suitable aggregation scheme is required. Currently, in the national and EU FADN, a so-called simple aggregation scheme is used to aggregate farm individual data to the sectoral account. The weighting factors for each sample farm are based on the number of sample farms within the socio-economic farm groups defined by region (Laender), farm type, and standard

[3] Farm Accountancy Data Network.

[4] Kuratorium für Technik und Bauwesen in der Landwirtschaft e. V., Darmstadt.

farm income. A projection applying ‘simple’ aggregation factors results in significant deviations from the statistical frame data with respect to land use and livestock numbers. This method is rather well-suited to represent standard farm income and thus for agricultural policy measures oriented towards farm income, but it has some deficiency to represent the levels of land use, animal stock and quantities of products.

To solve this problem, an improved aggregation scheme has been developed by Jacobs (1998), based on an approach described by Merz (1983). The objective is to find new aggregation factors that are consistent with the statistical frame data, and which are still closely related to the 'simple’ aggregation factors applied within the existing FADN. The chosen estimation method minimises the cross-entropy (as a measure of informational distance) between the new aggregation factors and the prior information supplied by the ‘simple’ aggregation factors, subject to the restriction that the resulting aggregated figures for twelve important variables (e.g. land use and livestock numbers) come close to the known totals. The consistent aggregation scheme allows a better representation of land use and animal production than the system actually used. It can also be concluded that total production, inputs and subsidies are represented much better than with the simple aggregation scheme (Osterburg et. al., 2000). In Table 2.1 some aggregated amounts on the basis of farm groups are compared with the sectoral data for the years 1996 and 1997 (arithmetic mean). With respect to livestock numbers and quantities of production, a high accuracy of the estimate is ensured, while the area of Grandes Cultures as well as for permanent grassland is slightly underrepresented. The latter can be attributed to the fact that the statistical data base used as framework for the optimisation of aggregation factors excludes small farms of less than € 7669 which have a relatively high share of grassland, as well as farms run by legal persons in western Germany. In general, the utilisation of arable land as well as the grazing livestock activities are well represented by this sample whereas a remarkable share of the pig and poultry production is underrepresented because of the sizeable share of commercial farms[5] not taken into consideration.

In the model a total of 27 main activities of crop and 15 activities of livestock production are differentiated. For calibration purposes, a positive mathematic programming (PMP) procedure is used, generating non-linear cost terms in order to take continuous adaptation processes into account.

[5] In Germany, farms exceeding a certain stocking rate are defined as trade enterprises not belonging to the agricultural sector covered by the survey.

Table 2.1: Comparison of the sector figures from the survey with the projected sizes at the level of farm groups for the year 1996/97

		Survey [1)]	Projection	Deviation in %
Milk cows	Units	5,110,000	5,092,707	-0.3
Bulls for fattening	Units	2,224,000	2,227,254	0.2
Milk production	1,000 t	28,741	28,262	-1.7
Beef production [2)]	1,000 t	1,554	1,567	0.8
Grassland area incl. forage acreage	1,000 ha	5,538	4,921	-11.1
Grandes Cultures	1,000 ha	9,060	8,522	-5.9

1) Source: Statistical Yearbook of Food, Agriculture and Forestry 2000, Münster-Hiltrup.
2) Incl. Calves.
3) Acreage of grain, legumes and oil seeds.

For the objective function farm income[6] minus opportunity cost for labour and the interest on borrowed capital is maximised. The main restrictions cover the areas of:

- feeding (energy and nutrient requirements, calibrated feed rations)
- intermediate use of young stock
- fertiliser use (organic and mineral)
- labour (seasonally differentiated)
- crop rotations
- political instruments (e.g. set-aside, quotas)

In the simulation process most of the cropping activities are differentiated by various intensity levels (with extensive production processes). For family labour opportunity costs were fixed at 6.14 €/hour, while for arable and grassland (owned by farm or rented) opportunity costs at the rate of the rental price were implemented. Due to this full cost approach the long term adaptation reactions of the farms to changing economic conditions are assessed.

The policy simulation process (ex ante analysis) usually proceeds in two steps. In the first step a reference scenario is created for a target year in the future, assuming that the present agricultural policy will continue. Furthermore, estimates on changes in technical progress and economic conditions are used as external model input. This concerns especially yields of crop and livestock production and monetary coefficients, e. g. input and output

[6] Farm income is here referring to net value added. From this, the costs of fixed factors regardless whether they are owned by the farmer or not, have to be covered.

prices. The estimation of the future development of yields depending on technical progress is based upon techniques of time series analysis which results in annual growth rates. The development of producer prices for agricultural products has to be viewed against the political background in the reference scenario. The price projections are the result of the model calculations from the partial equilibrium model GAPsi.

In a second step, alternative policy measures are specified, e. g. through additional activities and restrictions or changes of matrix coefficients. The outcome of the optimisation can be compared to the results of the reference scenario and allows the derivation of statements on the impacts of different policy measures. The definitions of the reference and alternative policy scenarios as well as assumptions are harmonised with those used in other models of the FAL working group.

2.4 Model specification of BEMO

Within the framework of the study the model was rearranged on the data source of the national Farm Accounting Data Network (FADN). Using an advanced computing technique it was possible to run the model for almost all farms producing milk available in the data-base. This makes it possible to predict changes in farm organisation at the decision level of individual farms and to aggregate the results up to the sector level by means of weighting factors. This bottom-up approach allows the measurement of differentiated consequences on a representative basis and an examination of questions such as impacts of milk quota trade.

At present, horticultural crops, sheep and poultry are not included in the model. Therefore, all enterprises aligned to these activities must be excluded. For the study only farms with dairy holding were included (milk production of more than 10 t per year). The total of 4,808 farms represent about 90 % of milk production of the sector. Data from the economic year 1997/98 is used.[7]

The input/output coefficients are defined on the basis of standard values as far as they are not available in the accounting data; they are calibrated with proportional correction factors to the farm accounts. This occurs for the use of mineral fertilisers and pesticides as well as for seed. Referring to concentrated feed, farm's individual correction factors were

[7] The individual farm's accounting data for the financial year 1997/98 serve as the data-base. In light of levelling the fluctuations on returns and prices, it would be better to take a two to three year average as a basis. At the time of data processing, the data for the financial year 1999/2000 was not available. In the financial year 1998/99, the prices of pork were low, such that large deviations from optimum solution and actual situation could have been expected.

derived from the optimum solution of a base run. Restrictions on production were derived from the animal stock and sales data, whereby it has not succeeded in establishing a complete consistency between the base solution and the existing situation.

The calibration of the demand and supply of roughage-fodder caused special problems. Yields of grassland and fodder maize at the regional level are used as a starting point. As various intensity levels were allowed for dairy cows, cattle breeding and fattening, the correction factors for roughage yield derived from a first model run could induce further farm adjustments in a following run. Within a multi-step approach technical coefficients for roughage input and output are calibrated, although a complete consistency could not be reached. The underlying procedure leads to lower yields of grassland within a ten-year projection period as the number of cows decreases due to the increase of milk yields. It was highlighted by the model computations, that without the delimitation of a confidence interval for the correction factors, the costs of roughage fodder production by extensive cultivation, due to opportunity costs of land, will increase such that it will lose competitiveness. Therefore, the lower limit for the correction factor of raw-fodder-yield was fixed at 0.75, which leads to the fact that grassland of some farms might be in excess. On the other hand, some farms in the new Laender show an extremely high cattle density because they are buying roughage crops from neighbouring farms, due to ongoing co-operation since the Socialist period. Fixing the correction factor to a maximum of 1.7, the following adjustment possibilities were basically allowed:

– conversion of arable land into grassland
– renting grassland up to 40 % of UAA for farms of the new Laender with livestock densities of more than 3 cattle LU per hectare of roughage area; all other farms could rent grassland with 10 % higher prices depending on the higher fodder demand with extending milk production under conditions of an exit of milk quota
– leasing of grassland with 40 % lower lease price for grassland; thereby is to be achieved that a reduction of cattle husbandry will not be hindered by zero opportunity costs for grassland

Production costs

In contrast to FARMIS only variable costs, the rent of leased land and wages for hired labour are taken into account; fixed costs of farm owned factors are not considered. The model therefore shows rather short-term adjustments.

The following cost components are treated as decision variables:[8]

- Rent of land up to the current situation as well as in the extent mentioned above, whereby the average lease price is converted into rents for arable land and grassland assuming a price relationship of 3 to 2.[9]
- Costs for permanent and temporary workers as well as for remunerated family workers are determined on the basis of farm accounts. For non-salaried workers opportunity costs are taken into account according to 50 % of 'standard wages' given in the FADN database (updated with the labour costs index).[10]
- The investment costs for new cattle stable by capacity enhancement beyond the short term scope for adjustment.

Depending on the level of fixed and rented factors as well as for family or hired workers the marginal production costs vary between variable and full costs. In farms with a high share of owned factors, marginal costs of milk production are mainly determined on the basis of variable costs. Large farms in the new Laender having a high share of rented land and hired workers are working on a full-cost basis.

Scope for adjustment in milk production

With the abolition of milk quotas, the question of the scope for adjustment of milk production gains importance. With unfavourable economic conditions, i. e. the reduction of the milk price and partially compensating direct payments, farms might have to curtail or give-up milk production. On the other hand, efficiently managed farms, which were hampered by the milk quota regime and high quota costs until now, might expand milk production. The questions occur whether an expansion of production could be achieved within available capacities or with extra investments. Free stable capacities are available in this respect, because in 10 years time, the number of cows had to be reduced by about 20 % due to constant quotas and the increase in productivity. Farms with 'free stable barns' can partly rededicate buildings for heifers to be used for dairy cows. On the other

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[8] Beside the milk prices it was also planned to use the farm individual data for leasing of milk quotas as well as the super levy into account. Test calculations showed, however, that the production quantities burdened with quota costs or the super levy were not realised any more already with milk price reductions of 20% in a large share of enterprises, such that the increase of milk production in the transition is far less than the underlying increase of milk quota in the scenarios. Therefore, these cost positions were not taken into account in the further calculations.

[9] Premiums for agri-environmental measures as well as for the compensatory allowance for less favoured areas are only taken into account for the whole farm, assuming that they are rather neutral on production.

[10] The minimum value for the wages for hired-workers is accordingly advanced. In order to establish the comparability of the income effects, the opportunity costs for family-workers are then added to the gross margins of the optimal solution.

hand, the cattle stable of small farms is often technically outdated, so that the available capacities might not be used under economic conditions of an exit of quota.

Due to lack of farm specific information on stable capacities, it was attempt to determine the short and long-term scope for adjustment on the basis of development of farms in the past. The change of milk production is assessed on the basis of a constant sample of dairy farms between 1995/96 and 1999/2000. Table 2.2 shows the distribution of farms of different cow stock sizes of 1999/2000 related to 1995/96. 50 % of farms with less than 10 cows moved out from milk production and only 10 % moved in a larger size class. For farms with 10 to 20 cows 15 % stopped milk production. The group with 150 to 250 cows likewise shows a relative high share of farms (14 %) giving up milk production. This might concern mainly enterprises of the new Laender, which have been partly converted (Table 2.2) to suckler-cows keeping. In summation it is to be noted that:

– A large number of the farms with small stocks of cows have given up milk production or are stagnating
– Farms with more than 40 cows in western Germany grew substantially, which was only possible by the purchase or rent of quotas in conjunction with investment in stable capacities
– Farms of the new Laender with large dairy cattle stocks are rather stagnating

Based on these results, the change of the milk production was determined on the basis of its development between 1995/96 and 1999/2000, differentiated by size class, regions and the level of milk yields (see Table 2.3). All farms with declining or stagnating milk production were included in one class. As the constant sample includes only 3,654 farms, the change of milk production was randomly passed on to the sample of 4,808 farms used in BEMO, using the same criteria of the cluster.

These change rates are used to represent the scope of short time adjustments of milk production.[11] If unused capacities of unpaid workers and grassland are available, the expansion of milk production can be achieved on a variable cost basis (including the minimum level of non-paid labour). In other enterprises, i. e. with a legal status, the total of labour costs and the rental price for land are included in the marginal costs. Capital costs are included for those farms extending their stable capacities. For the latter it is assumed that 0.4 ha of grassland can be rented in combination with one new stable slot.

[11] Short term adjustment scope beyond 35% is not permitted.

Table 2.2: Change in the distribution of dairy farms by size classes between 1995/96 and 1999/2000, starting from 1995/96

Cow size class 1995/96	Share of farms in cow size class in 1999/2000 %												
	without cows	≤ 10	≤ 20	≤ 30	≤ 40	≤ 50	≤ 75	≤ 100	≤ 150	≤ 250	≤ 400	> 400	obs.
West Germany													
≤ 10	48,5	**45,6**	5,3	0,0	0,0	0,0	0,6	0,0	0,0	0,0	.	.	171
≤ 20	15,2	14,5	**60,6**	8,9	0,5	0,4	0,0	0,0	0,0	0,0	.	.	796
≤ 30	5,5	3,4	13,7	**61,9**	11,8	3,1	0,5	0,0	0,0	0,0	.	.	964
≤ 40	2,4	0,7	2,0	13,8	**56,9**	17,6	6,7	0,0	0,0	0,0	.	.	596
≤ 50	2,1	0,3	1,8	1,5	12,9	**47,3**	33,5	0,3	0,3	0,0	.	.	334
≤ 75	1,3	0,3	0,0	1,0	1,0	9,7	**70,3**	15,8	0,7	0,0	.	.	310
≤ 100	0,0	0,0	0,0	0,0	1,6	0,0	21,9	**56,3**	18,8	1,6	.	.	64
≤ 150	0,0	0,0	0,0	0,0	0,0	0,0	0,0	18,2	**63,6**	18,2	.	.	11
≤ 250	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**100,0**	.	.	2
Total	8,7	7,1	19,7	23,3	15,5	10,0	12,0	2,7	0,7	0,2	.	.	3.248
East Germany													
≤ 10	33,3	**50,0**	16,7	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	6
≤ 20	0,0	0,0	**81,0**	14,3	0,0	0,0	4,8	0,0	0,0	0,0	0,0	0,0	21
≤ 30	0,0	3,3	6,7	**63,3**	10,0	3,3	10,0	0,0	3,3	0,0	0,0	0,0	30
≤ 40	0,0	0,0	0,0	11,1	**33,3**	40,7	14,8	0,0	0,0	0,0	0,0	0,0	27
≤ 50	0,0	0,0	0,0	0,0	0,0	**51,7**	44,8	3,5	0,0	0,0	0,0	0,0	29
≤ 75	6,0	0,0	0,0	3,6	0,0	8,3	**64,3**	13,1	3,6	1,2	0,0	0,0	84
≤ 100	5,0	0,0	0,0	5,0	5,0	0,0	20,0	**55,0**	10,0	0,0	0,0	0,0	20
≤ 150	0,0	0,0	0,0	0,0	0,0	0,0	0,0	13,3	**80,0**	6,7	0,0	0,0	30
≤ 250	14,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	11,4	**74,3**	0,0	0,0	35
≤ 400	4,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2,4	16,7	**66,7**	9,5	42
> 400	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	17,1	**82,9**	82
Total	3,7	1,0	4,9	7,1	3,2	8,4	19,5	6,7	8,6	8,9	10,3	17,7	406
Germany													
Total	8,1	6,5	18,1	21,5	14,2	9,9	12,8	3,2	1,6	1,1	1,2	2,0	3.654

Source: Own calculations based on the national FADN; constant sample of farms. Kleinhanss_2001-12-20

Table 2.3 Change of milk production by size class, regions and milk yields since 1995/96

Cow size class 1995/96	Share of farms ... % change of milk production 1999/2000 against 1995/96								
	< 0	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	> 30	obs.
North <5000 [1]									
≤ 10	85	0	0	0	0	4	0	11	27
≤ 20	64	12	5	7	3	7	0	2	59
≤ 30	33	11	11	5	9	9	2	20	55
≤ 40	41	12	15	0	12	18	3	0	34
≤ 50	22	9	13	0	13	4	0	39	23
≤ 75	35	8	15	8	0	4	8	23	26
≤ 100	0	50	0	0	50	0	0	0	2
Total	47	10	9	4	7	8	2	13	226
North >5000									
≤ 10	88	4	4	0	0	0	0	4	25
≤ 20	63	10	6	8	2	3	1	6	144
≤ 30	44	13	9	9	2	2	4	17	170
≤ 40	31	8	12	5	7	6	5	25	131
≤ 50	21	12	8	10	6	8	3	32	130
≤ 75	22	9	7	11	8	12	8	23	159
≤ 100	21	17	14	10	5	5	5	24	42
≤ 150	38	0	13	0	25	13	0	13	8
≤ 250	0	0	0	50	0	0	0	50	2
Total	37	10	9	9	5	6	4	20	811
Centre/South <5000									
≤ 10	72	5	5	2	3	3	1	9	101
≤ 20	55	9	9	6	3	5	3	10	441
≤ 30	41	11	12	6	7	6	2	14	422
≤ 40	35	13	9	5	8	5	6	19	203
≤ 50	22	3	14	8	6	11	12	25	65
≤ 75	25	14	6	11	8	11	3	22	36
≤ 100	38	13	0	13	0	0	0	38	8
Total	46	10	10	6	5	5	4	14	1,276
Centre/South >5000									
≤ 10	89	0	0	6	6	0	0	0	18
≤ 20	62	9	4	6	3	7	3	7	152
≤ 30	39	10	16	9	6	2	2	15	317
≤ 40	35	12	11	10	5	4	6	18	228
≤ 50	20	10	13	9	11	5	4	28	116
≤ 75	20	7	7	13	6	11	9	27	89
≤ 100	8	8	8	0	33	17	17	8	12
≤ 150	0	0	0	0	0	33	0	67	3
Total	38	10	11	9	6	5	4	17	935
East Germany <5000									
≤ 10	67	0	0	0	0	0	33	0	3
≤ 20	25	0	0	8	17	8	0	42	12
≤ 30	13	19	25	0	0	0	0	44	16
≤ 40	9	9	0	0	0	0	9	73	11
≤ 50	0	0	0	25	0	13	13	50	8
≤ 75	21	0	0	0	29	7	0	43	14
≤ 100	25	0	0	0	0	25	25	25	4
≤ 150	40	0	0	20	0	40	0	0	5
≤ 250	39	11	6	11	11	6	0	17	18
≤ 400	11	11	0	0	11	11	11	44	9
> 400	13	0	33	7	13	27	0	7	15
Total	21	6	9	6	10	10	4	34	115
East Germany >5000									
≤ 10	33	0	0	0	33	33	0	0	3
≤ 20	11	33	22	0	0	11	0	22	9
≤ 30	36	7	7	0	14	7	14	14	14
≤ 40	6	6	19	13	0	0	19	38	16
≤ 50	14	5	0	14	10	19	10	29	21
≤ 75	23	10	9	9	4	7	9	30	70
≤ 100	44	6	0	6	6	0	6	31	16
≤ 150	28	8	4	16	0	20	4	20	25
≤ 250	47	6	6	24	12	6	0	0	17
≤ 400	30	21	12	9	0	6	0	21	33
> 400	24	18	13	15	6	12	1	10	67
Total	26	12	9	11	5	10	5	21	291

1) Region North (Schleswig-Holstein, Niedersachsen, Nordrhein-Westfalen), Centre/South (all other states of West Germany); class of milk yield expressed in kg/cow.

Source: Own calculations based on the national FADN; constant sample of farms. Kleinhanss_2001-12-20

2.5 TIPI-CAL

The International Farm Comparison Network[12] forms the methodical framework for this analysis. The source for generating and comparing data in the network is based on so called 'typical farms'. For the construction of a typical farm, farmers, advisors and scientists closely work together. This comprises a very detailed specification of the data in the status quo situation and a discussion and specification of future adjustment and development paths of the typical farms. For the present analysis the following farms were chosen (Annex 2, Table A2.2)

– Region South: 35-cow farm, an average sized farm in western Germany. Further activities: crop production (12 % of UAA)

– Region North: 68-cow farm, above average sized farm in western Germany, farm size was already established before the introduction of milk quotas. Further activities: crop production (31 % of UAA), rearing of bulls.

– Region East: 650-cow farm, typical large farm in eastern Germany. Further activities: crop production (54 % of UAA).

TIPI-CAL is conceptualised as a dynamic simulation model. In contrast to the above mentioned comparative static models, the effects of the stepwise implementation of Agenda 2000 as also of the transition phase up to phasing out of the quota system are to be analysed with this model. The scenarios of a quota-exit are compared with the baseline, in which the present policy (implementation of the Agenda 2000 including the milk market reform 2005 to 2007, continuance of the milk quota regime) is to pursued beyond the year 2008.

In the first place, the growth of farm income in a time period of 10 years is examined under the explained policy scenarios. The structure of the farm (number of cows, scope of production) is kept constant. Subsequently the growth potential of the farms is examined, in order to quantify individual farm’s possibilities for farm adaptations under the ‚new‘ policy framework.

2.6 Scenarios

According to the regulations of Agenda 2000, the milk quota regime is in effect until the end of the milk-market year 2007/08; therefore, it obviously provides for an exit of quota at the earliest in 2008. On the other hand, it would be conceivable that within the mid-

[12] To objectives and procedures of IFCN. Deblitz et.al., 1998; Hemme, 2000.

term review of Agenda during 2002/03, an approval on the exit of the quota regime might be decided. This would allow for preparation of the quota exit with a perennial transition period.

The devaluation of the milk quotas is a pre-condition for an exit of the quota regulation. This should be achieved by the application of appropriate market policy measures, i. e.

– price reductions in connection with
– direct payments which are at least partially decoupled from production

The instruments used in the milk market reform of Agenda 2000 could be modified in preparing for an exit of the quota system.

Corner stones of the **scenarios** are:

– Transition period starting from 2004/05 and extending the stepwise introduction of the milk-market reform with a further step
– Exit from the milk quota regulation in 2008:
  - Replacing the intervention prices by a safety net comparable to the market regulation for beef, allowing milk price reductions of up to 30 %
  - Direct payments on the level of a 4th step of the milk market reform, alternatively paid as

    (1) **Milk premium** (premia restriction according to the milk quantity of a reference periode, without tradability of the premium rights)

    (2) **Grassland premium** (for permanent grassland and arable fodder crops excluding forage maize), to be based on the total premium volume for 'beef and milk premiums of a reference' and without regional differentiation.

The scenario conditions (with reference to the exit from the milk quota regime) are summarised in Table 2.4. The final stage of Agenda 2000 is used as a **reference** for the scenarios of an exit of quota.

Table 2.4: Change of milk price, quota and premia for the scenarios

Year		02/03	03/04	04/05	05/06	06/07	07/08	2008	2008	2008
Reference				Agenda 2000						
Change of milk price %	Code				**Ref_5**	**Ref_10**	**Ref_15**			
Intervention price					-5%	-10%	-15%			
Producer price					-3.60%	-7.30%	-11.20%			
Change of milk quota					0.5%	1.0%	1.5%			
Milk premia	€/t				8.33	16.66	24.99			
Exit of milk quota					Transition period				Quota exit	
Intervention price				-5%	-10%	-15%	-20%			
Producer price				-3.60%	-7.30%	-11.20%	-18.70%	-22%	-25%	-30%
Change of milk quota				0.5%	1.0%	1.5%	2.0%		without MQ	
Direct payments										
Milk premia	Code			**Ag_05**	**Ag_10**	**Ag_15**	**Ag_20**	**Mp_22**	**Mp_25**	**Mp_30**
	€/t			8.33	16.66	24.99	33.32	33.32	→	
Grassland premia [1)]	Code							**Gp_22**	**Gp_25**	**Gp_30**
	€/ha							353.35	→	

1) Grassland premia being derived from the total volume of milk premia and beef premia at sector level.

Kleinhanss_2001-12-20

The **exit from the milk quota** should be introduced through an extended transition phase from 2004/05 till 2007/08, during which the intervention price for milk could be reduced by up to 20 %. The milk quota will rise by 2.0 % and the milk premia, which is linked to the milk quota, will increase to € 33.2/ton. Reasons for a transition period are the following:

– The process of policy making towards a substantial milk market reform might certainly need considerable time, especially as there is no external pressure requiring the modification of decisions taken for Agenda 2000. The introduction of the milk market reform in 2002/03 would therefore be unlikely.

– A significant devaluation of the quota value via further milk price reductions and partially de-coupled direct payments should be achieved. For this the present milk premia should be de-coupled from the quota as far as possible, which could be achieved by a modification towards a 'staggered producer incentive price system' or through a transformation into cow-premia, grassland premia or combinations thereof.

– With an early announcement the farmers' decision making could take into account further economic conditions. It would further affect a lowering of the lease or purchase price of quota. The high purchase price that is presently realised (with the present quota trade) is economically only reasonable with a continuing of the quota regime.

In the case of scenarios for the **exit of the milk quota** alternately milk price reductions of 22 %, 25 % or 30 % are taken into account. The first and second mentioned price adjustments pursue the price changes determined within the market models.

It is to be assumed that further reforms in the milk sector will be in consensus only if income deficits are partially reduced by higher direct payments. The increase of the premium volume according to a further step of the Agenda seems to be realistic. The additional subsidies would have to be made available by an increase in the budget and/or the shifting of transfer payments from other areas. Output deficits due to milk price reductions beyond 20 % would then no longer be compensated. Furthermore, **direct payment systems** differing by their linkages on production are considered :

– **Milk premium** (Mp_yy)[13] oriented to the principles of Agenda 2000; they are granted only up to the milk quantity produced in a reference. For farms whose milk production does not exceed the level of the reference, the producer incentive price equals to the price of milk plus premium, while for farms exceeding production it is equal to the milk price (graduated producer incentive price).

[13] Relative change of the producer’s price in percentage (22, 25 or 30 %).

– **Grassland premium** (Gp_yy)[14]: These can to a large extent be regarded as de-coupled from production. The premium volume 'milk' as well as headage premia within the market regulation for beef is transferred into a premia for grassland and other arable fodder crops (without forage maize). The grassland premium is not regionally differentiated.

Since the transfer payments are related to price reductions of 20 % , the premia are constant independent of the level of milk price. They amount to

– € 33.2 per ton for the milk premium (Mp_)

– € 353.3 per hectare for the grassland premium (Gp_).

In addition, definite parameter constellations or scenario conditions were examined within sensitive analysis explained in the related chapters.

Finally it is to be pointed out: The specification of the models is different with regard to the production relation of premia. In GAPsi, direct payments are always included into producer incentive prices, however without quantity restrictions. On the basis of simulations with the farm models the degree of production linkages of direct payments is assessed (see following chapter). The results are used for the calibration of the supply function in GAPsi.

Excursion: Production effects of milk premia

For the scenario 'milk premia' it is assumed that the premia will be paid for milk prodution up to a farm individual quantitity of a base-year (used milk quota in 1999). For farms, which produce less than or equal to the reference quantity, the premium payment lowers the extra costs. Therefore in these cases the premium is to be regarded as fully coupled to production. In the case of an expansion of production beyond the reference quantity the extra costs of production are not influenced, and the premium is to be classified as de-coupled. This effect can not endogenously be handled in the more highly aggregated models as GAPsi. Therefore, by simulation calculations with the individual-farm model BEMO, the average production effect of milk premia was determined, which enters exogenously in the market model GAPsi.

With the model BEMO aggregated price-supply functions with and without milk premia are calculated on the basis of farm individual results assuming a decrease in milk prices by 15, 20, 25 and 30 %.[15] Figure 2.1 shows the supply curves for both situations (S1 and

[14] Calculated on the basis of FARMIS and RAUMIS.

[15] In the case of these calculations no minimum wage approach for not remunerated workers was taken into account. The supply function is therefore not comparable to the results presented in chapter 5.

S2). In the case of full production effectiveness of the milk premium the supply curve A1 (without premium) would have shifted downward equal to the amount of the premium (S3). Based on the relationship of the vertical distance from S1 to S3 and S1 to S2 the average production effectiveness of the premium can be deduced. The average production effectiveness of the premium depends on the level of the decrease in prices and lies here between 60 and 70 %.

In the model FARMIS a production effectiveness of the premium is to be observed only with larger price reductions on the basis of the aggregation of individual enterprises to farm groups (see Figure 2.2). It is to be recognised that the subordinate limit of the milk premium to the reference quantity of individual-farms lowers the sectoral supply elasticity.

Figure 2.1: Production effectiveness of the milk premium in the model BEMO

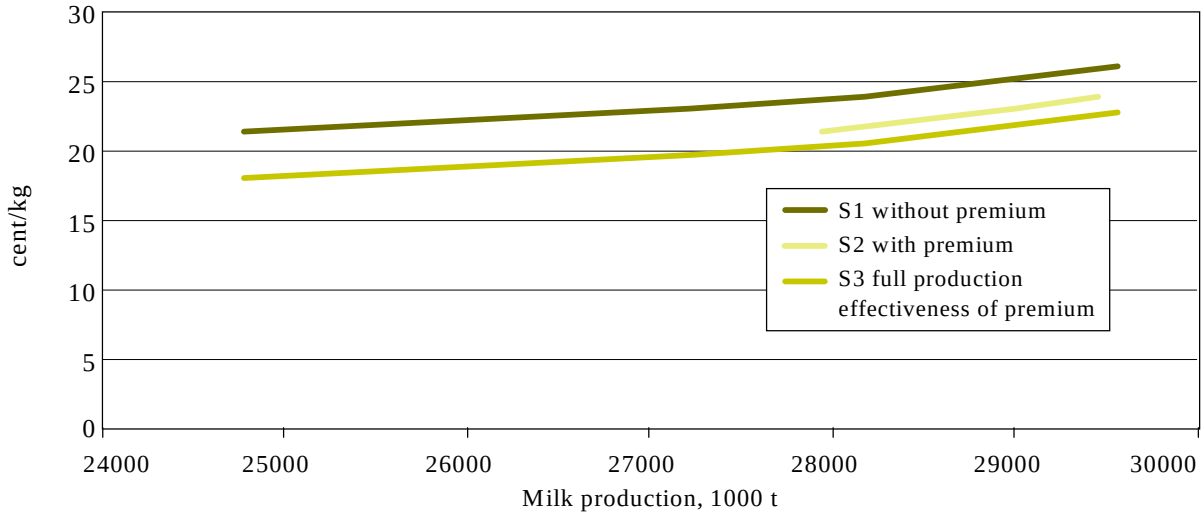
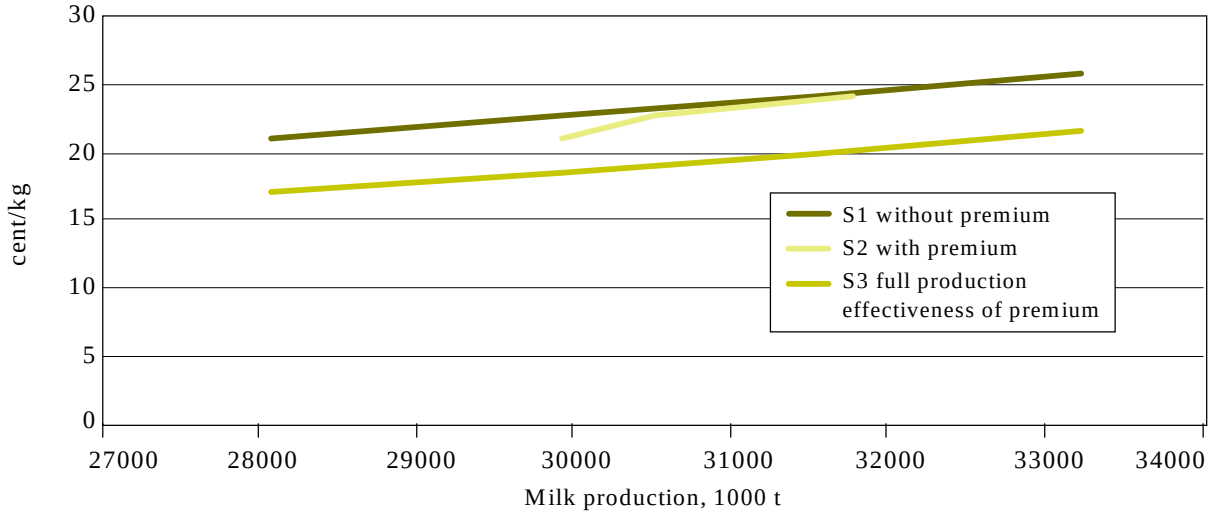


Figure 2.2: Production effectiveness of the milk premium in the model FARMIS



3 Analysis of the market effects of abolishing the EU milk quota regime

The analysis of the market effects of an abolition of the milk quota regime by the EU is made first on the basis of theoretical arguments and subsequently with the help of two quantitative equilibrium models. Since the frame of reference and the scenarios are applicable to each case, they are considered before hand.

3.1 The frame of reference of the analysis

The investigation concentrates on the milk market without considering all particularities of the Common Market Organization. Some aspects are less relevant for the objective of the analysis and disregarding them will simplify the models and the discussion. Hence intervention purchases must not be considered, because it can be assumed that in the medium term all stocks are cleared and used. The same argument holds for changes in stocks. Budgetary aid to consumption of butter and skimmed milk (powder), whose importance in the 90ies has already decreased, is not considered explicitly but these subsidies are included in the product prices. The differentiation between cow milk for which the quota regime applies in the EU and milk from other animals (goats, sheep, buffaloes) is represented in the models only in respect of raw milk. As opposed to this, the milk products of different types of animals are statistically not separated on the consumption side and consequently are combined.

Altogether, the following features characterize the milk market in the EU:

- The producer price for milk in the EU is stabilized and supported through the intervention prices for butter and skimmed milk powder at a level far above the prices prevailing in other countries. Hence, this price in the simplest case (model GAPsi, milk quotas are binding) is used as a fixed price. With the abolition of quotas the EU price is the equilibrium price (under the circumstances of external protection of the EU milk market). In the other model (MIPsi) the producer prices in the EU member states result from the valuation of milk produce, while raw material costs are derived from the intervention prices and the product composition.
- The domestic price of milk products is protected through export measures (import quotas, import duties, export subsidies).
- Raw milk production of EU member countries is restricted through national quotas. The overall quantity of these quotas clearly exceeds total EU demand at market prices. At the same time it is by far less than the quantity that could be produced at the given level of support price.
- Demand for milk (products) reacts clearly more inelastic upon price changes than supply of raw milk, when the latter is not fixed under the quota regime.

– The excess of EU production over total domestic demand is exported, with the price difference between EU and world markets being bridged by export subsidies.
– Subsidized exports are possible only within the restrictions set by the WTO Agreement on Agriculture, i.e. both the quantities of subsidized export as well as the budgetary outlays on export subsidies must be kept within predetermined limits and the latter are annually reduced as according to the WTO agreement. Thereby, the trade restrictions are intensified over time.

3.2 Scenarios

All the scenarios are related to the year 2008. Therefore, the future market developments are to be projected considering exogenous macroeconomic and general technical developments (as e. g., growth of population, economic growth, inflation, and technical progress in the form of increasing milk production per cow). The base year for projection is 1997. Any expansion of the EU likely take place before 2008 is disregarded in the context of this analysis. Thus, the European Union is always thought here as a Community of 15 member countries.

To be able to appropriately depict and discuss the effects of an abolition of the EU milk quota regime, a comparison with a reference situation is necessary. The reference situation chosen is the market situation in the year 2008 after the full implementation of Agenda 2000 (on the basis of the Berlin accord). For the sake of analysis it means that in each of the years 2005, 2006 and 2007 the intervention prices for butter and skimmed milk powder are reduced by 5 % of the level prevailing in 1997. Delayed by time and differentiated by member states, milk quotas of individual countries are increased by 2.4 % between the base year and the target year.

Two exit scenarios are contrasted with the reference scenario: Abolition of the milk quotas without compensation for the price reduction on one hand and abolition of the quotas with a (partial) compensation on the other.

3.3 Quantitative model analysis and results

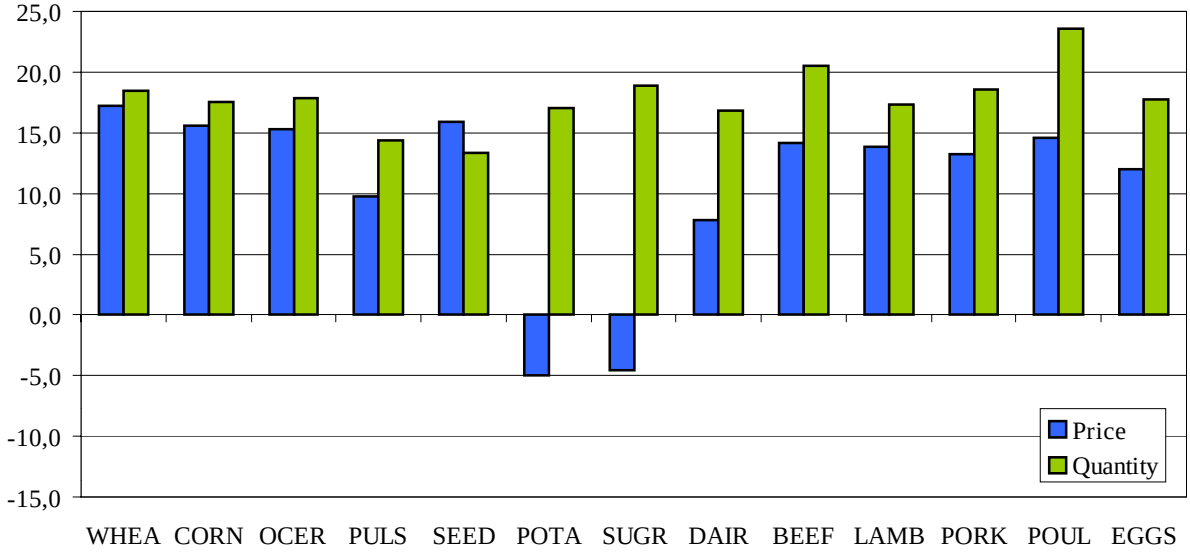
The macroeconomic situations of the individual scenarios are graphically depicted in a simplified form and later discussed with the data compiled in the tables.

3.3.1 The reference scenario: Implementation of Agenda 2000 and projection 2008

Before considering the details of the reference scenario relevant to the application of the Agenda decisions, the price and quantity projections made available for 2008 must be explained shortly. To begin with, the focus is on the world market (represented here by the region RoW = Rest of the World).

For reviewing the world market developments shown in Figure 3.1, some global trends are decisive. Firstly, the population in RoW will grow between 1997 and 2008 by 16.7 % and, secondly, it is assumed that there will be a general price increase of 2 % per annum, which gives rise to an increase by 24.3 % in 11 years. The price changes depicted in Figure 3.1 imply that all the producer prices considered in the model fall in real terms, yet not so much as in earlier decades. The increase in supply meets or exceeds in general the extent of population growth, so that world wide a slight increase in per capita consumption is to be registered[1]. The biggest increase in world supplies by about 23 to 24 % is expected for poultry meat. The decline in the nominal prices of sugar is to be viewed in connection with the unusually high prices in 1997. It does not threaten supply of demand. The weak rise in milk prices is to be seen in relation with the developments in the EU.

Figure 3.1: Price and quantity changes of world markets (Agenda 2000, 2008 vs. 1997, in per cent)



[1] In this connection, it is to be remembered that an over-proportionally strong growth of population in areas with far below average per capita consumption may cause the world average consumption to fall even if the consumption levels increase in all individual regions.

Regarding the price and quantity changes in the EU (Figure 3.2) quite different developments in the prices of cereals are to be noticed. This fact is a result of the world prices starting to exceed the EU intervention price at different points of time.[2] While within the different scenarios no changes in the common sugar market organisation are provided for, the EU sugar prices and quantities remain constant. In the area of animal produce the changes in prices and quantities are generally less in the EU than those at the world markets. The EU beef market, however, is characterized by a big decrease in prices (Agenda 2000) and also by a big decrease in production (as a consequence of, among others, the BSE crisis). Also with milk, the effects of realization of the Agenda decisions are reflected.

Figure 3.2: Price and quantity changes at EU markets (Agenda 2000, 2008 vs. 1997, in per cent)

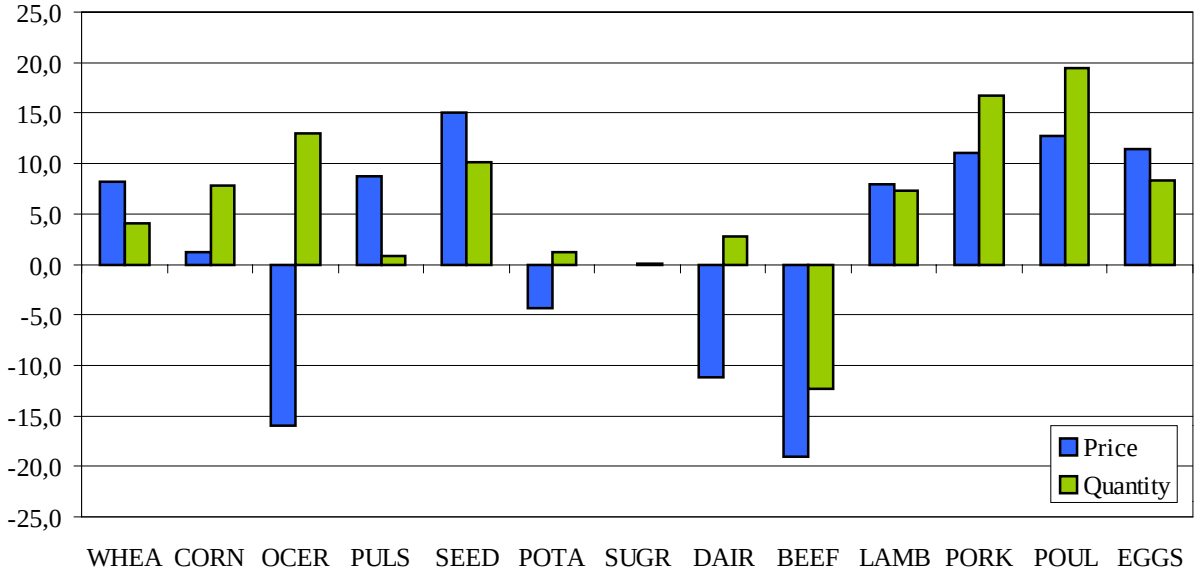


Figure 3.3 illustrates the economic relationship between production costs, producer rent and quota rent on the one hand and the support price and quota quantity on the other. The production value consists of all three, the two income values – producer income and quota rent – and the production costs.

In Figure 3.4 the reference situation for the year 2008 is indicated and compared with the situation before Agenda 2000 in the base year 1997.

[2] With the 'other' grains (OCER) the surpassing will take place only after 2008, so that in the model the cut in the intervention price has full effect upon the producer price.

Figure 3.3: Support price, quota and supply function of milk in the EU

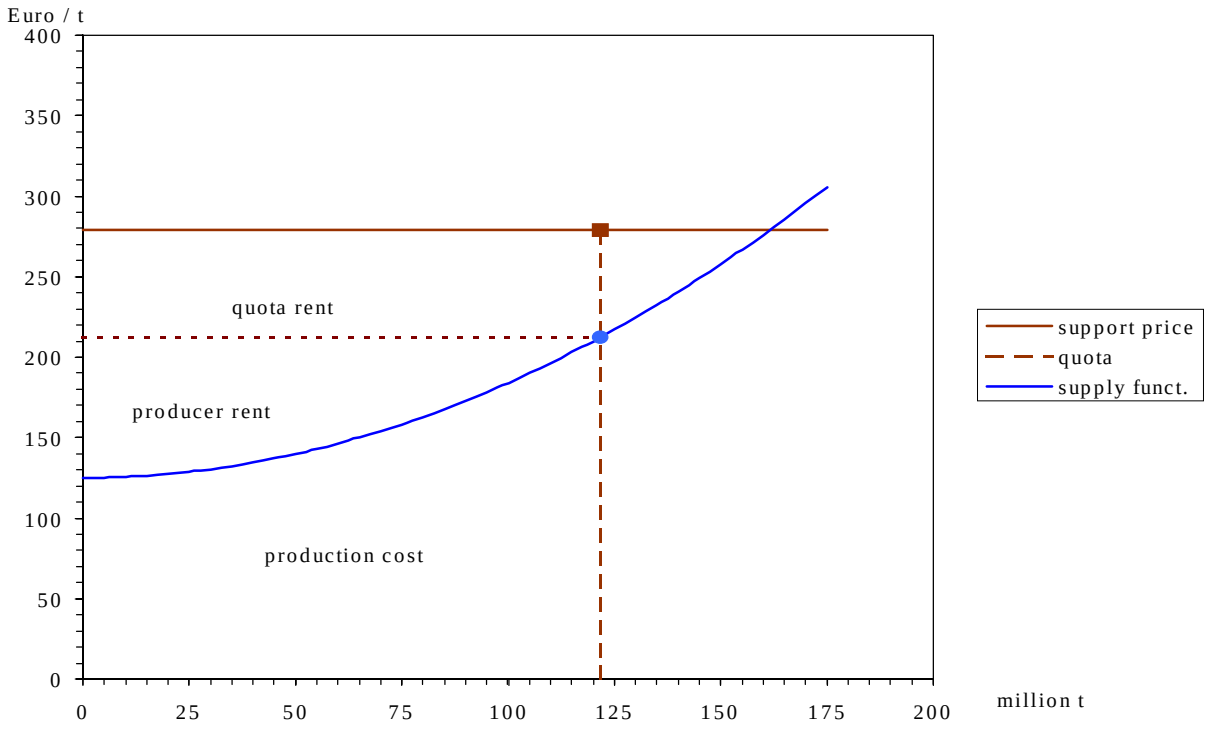
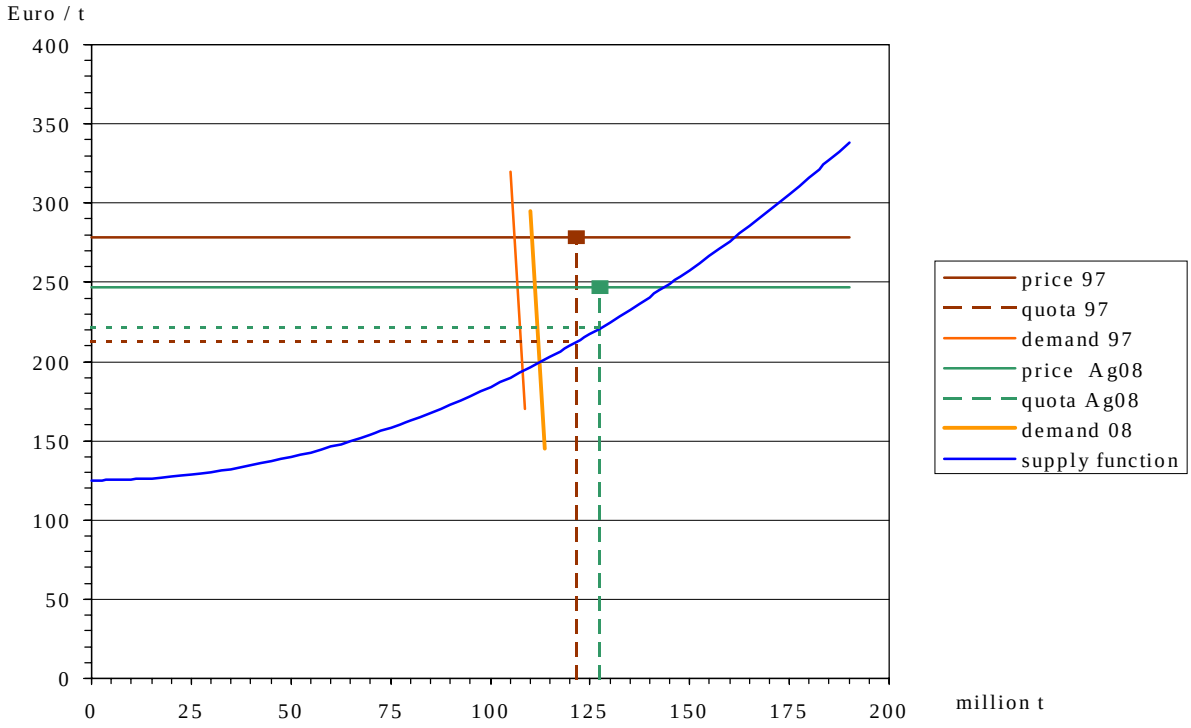


Figure 3.4: Supply and demand for milk in the EU (1997 and 2008)



NB: A possible shift of the supply curve due to technical advance is not considered.

The two situations differ in the level of intervention price as well as in the extent of production (quotas are binding and are taken as production). The domestic demand for milk and milk products increases due to the fall in prices (downward move on the demand curve). At the same time and independently from farm policy measures, population growth and income expansion contribute to an increase in demand (shift of demand curve to the right). In spite of the slow growth in EU population (+2.1 % over 11 years time) the population effect predominates with regard to total demand.

The supply curves make it clear that at the applicable support price a much larger quantity of milk could be produced than what is permitted under the quota regime. In spite of its progressive increase the supply curve in the relevant area takes a relatively flat course. This means that the price elasticity of supply is rather high ($\varepsilon \approx 1$). The demand curve takes a much steeper course ($\eta \approx -0.2$ with demand at consumer prices and, respectively, $\eta \approx -0.05$ with demand at producer prices). From this it follows that the price changes entail relatively strong supply changes, but only comparatively small changes in the domestic demand.

On the side of producers the implementation of price reductions that were decided for the years 2005-07 causes a clearly lower sector income from milk production. It consists of the producer rent, the quota rent and direct payments[3] which are increased in the context of the price reductions. The price reductions must be looked here as fully affecting income, because adjustments made by the producers to mitigate that effect through changes in the factors of production (land, labour and capital) are not taken into consideration in both models. The supply function and the producer rent remain unchanged.

With a complete passing-on of the price reduction to the consumers[4] the latter fully benefit through larger consumer rents from the decline in quota rents. Moreover, the decline in milk prices means an increase in real consumer income and is resulting in an increase in welfare. For the EU and national budgets the direct payments bring about new charges. In the case of exports there are not only savings through price affected lower subsidies but also extra expenditures through quota affected larger exports (Figure 3.5).

The reference scenario can be assessed as follows: Emanating from a support price of 278.8 €/ton in 1997 (corresponding to 90 % of the producer target price of 309.8 €/ton) the lowering of the intervention price in connection with the realization of Agenda will fully affect milk production. On the contrary, both models show a decline of the producer

[3] With the quotas binding, the direct payments have no influence on the amount of production.

[4] More realistic might, however, be to assume that a reduction in the producer price partly leads to an expansion of the trade and processing margins. With this a further distribution of the benefits to the disadvantage of consumers will occur.

price for milk to 246.7 €/ton, i.e. by 11.2 % against 1997 as compared to a reduction of support prices by 15 % (Figure 3.6).

Figure 3.5: World market of milk EU and RoW supplies and demand

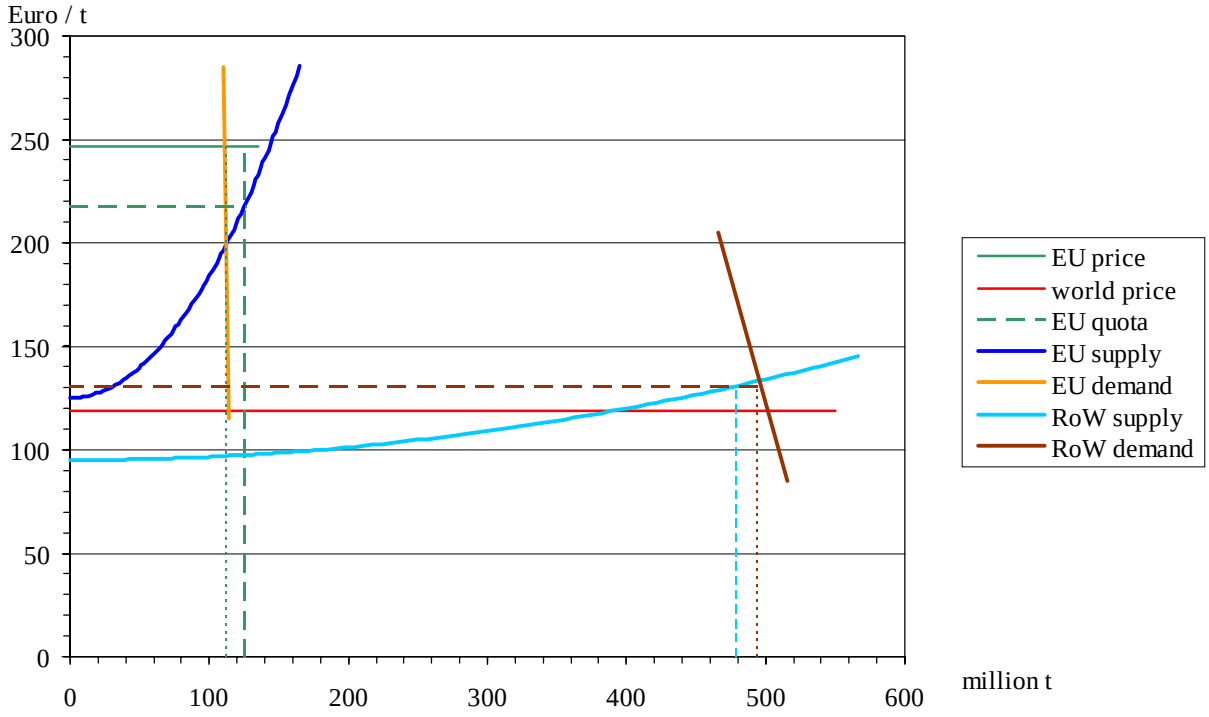
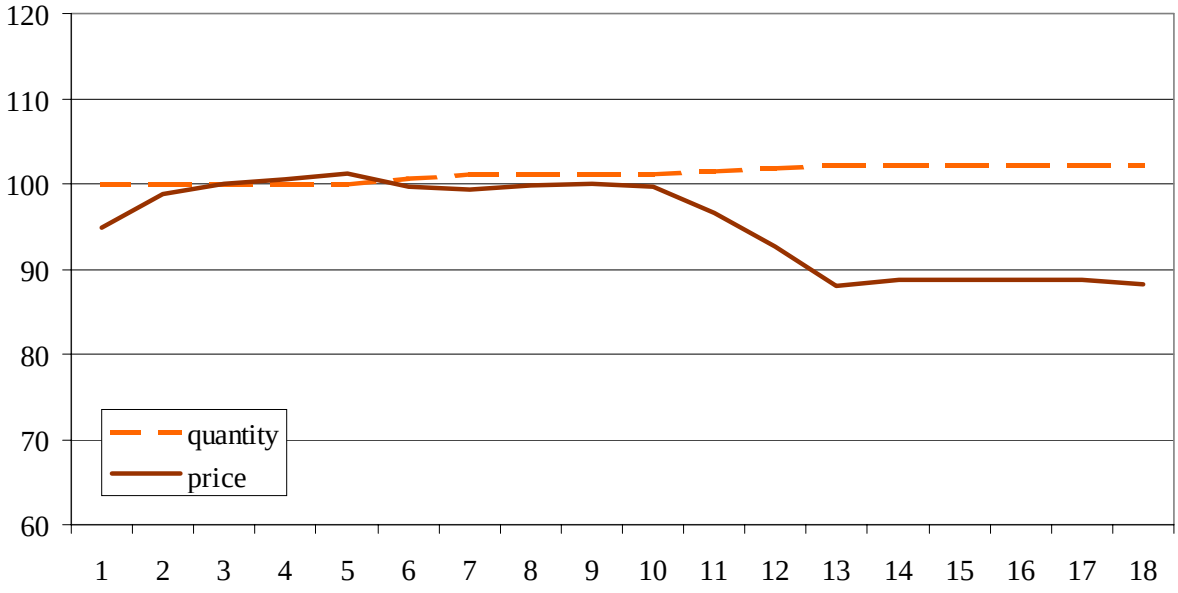


Figure 3.6: Milk production and producer prices in EU-15 – Agenda 2000 – (1997= 100)



The milk production under quota conditions corresponds to the available cow milk of 125.3 million tons (+2.4 % against 1997). The milk produced from other types of animals increases by 0.5% per annum to around 4 million tons. Total production of milk is 129.2 million tons.

Due to lower milk prices and higher income, per capita consumption increases by 0.9 % and the expansion of population (+1.86 %) lets total demand rise by 2.75 % as compared to 1997. Also the use of milk for livestock feeding rises in connection with the expansion of animal numbers. Due to almost parallel developments of supply and demand the production surplus and the net export quantity hardly change (Table 3.1)

Table 3.1: Supply and use of milk in the EU (results from model calculations based on GAPsi)

		1997	2008		
subject	unit	base	Agenda	exit -S.	exit +S.
total production	million t	125,57	129,23	131,65	134,89
cow milk	million t	121,83	125,26	127,67	130,91
other milk [a)]	million t	3,75	3,98	3,98	3,98
demestic use	million t	119,68	123,29	123,95	124,24
food [b)]	million t	112,45	115,90	116,46	116,69
feed	million t	7,23	7,38	7,49	7,55
net exports	million t	5,68	5,73	7,48	10,43
change in stocks	million t	0,21	0,21	0,21	0,21

exit -S. = quota abolition without subsidies (compensation for lower prices)
exit +S. = quota abolition with subsidies (compensation for lower prices)
a) goat, sheep and buffalo milk
b) incl. industrial processing

As the calculations with model MIPsi additionally show, the reduction in the intervention price for butter and skimmed milk powder means in the first place a lower valuation of the fat component. While milk protein loses only 2.5 % in price, milk fat is valuated 23 % less (Figure 3.7). Due to different consumption trends an increase in per capita consumption of cheese, fresh milk products and other milk products is expected, against a decrease with butter and skimmed milk powder milk fat is more abundant for processing than protein. The different demand developments (Figure 3.8) in combination with different raw material requirements (i.e. fat and protein content) of products cause a distinct divergence of dairy sales prices. Thereby, cheese becomes more expensive as opposed to butter and skimmed milk powder and even – yet less pronounced – other milk products become cheaper (Figure 3.9).

Figure 3.7: Raw milk and component prices in EU-15 – Agenda 2000 – (1997= 100)

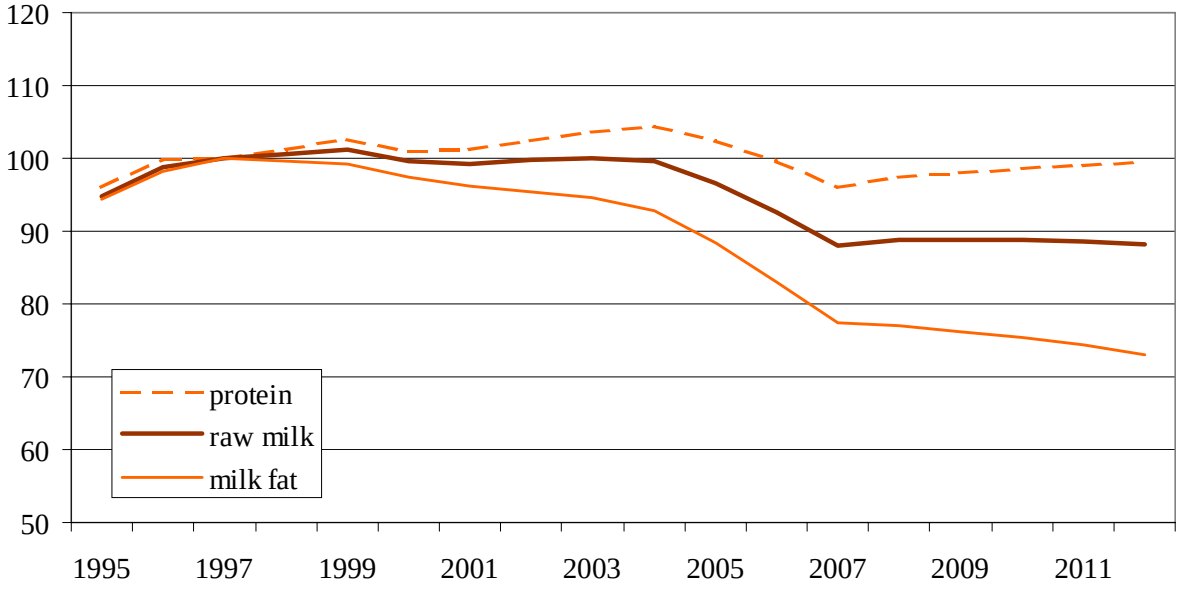


Figure 3.8: Per capita consumption of dairy products in EU-15 – Agenda 2000 – (1997= 100)

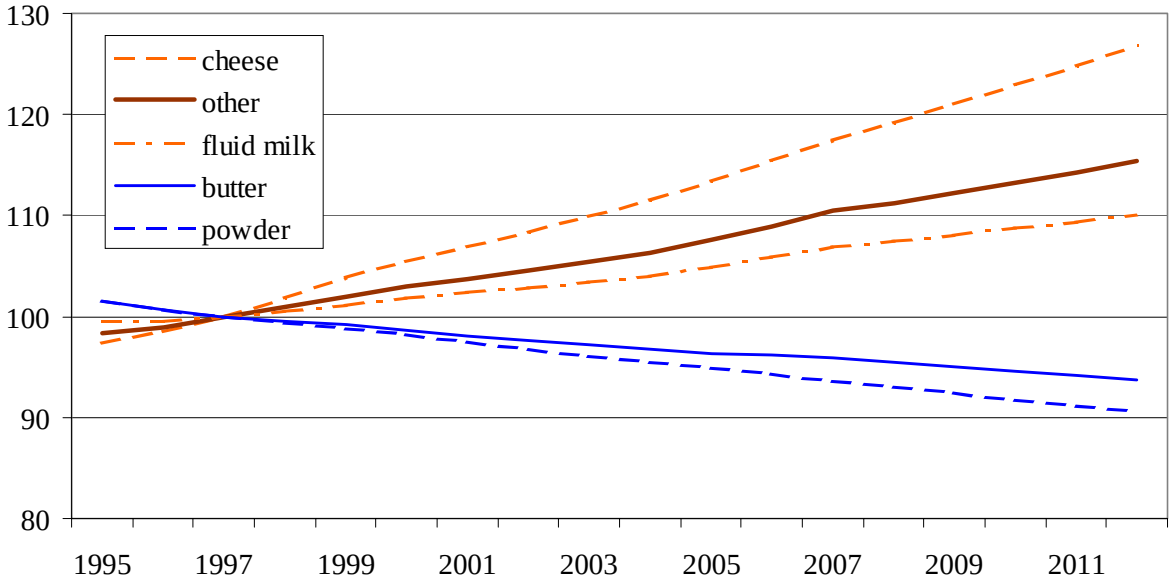
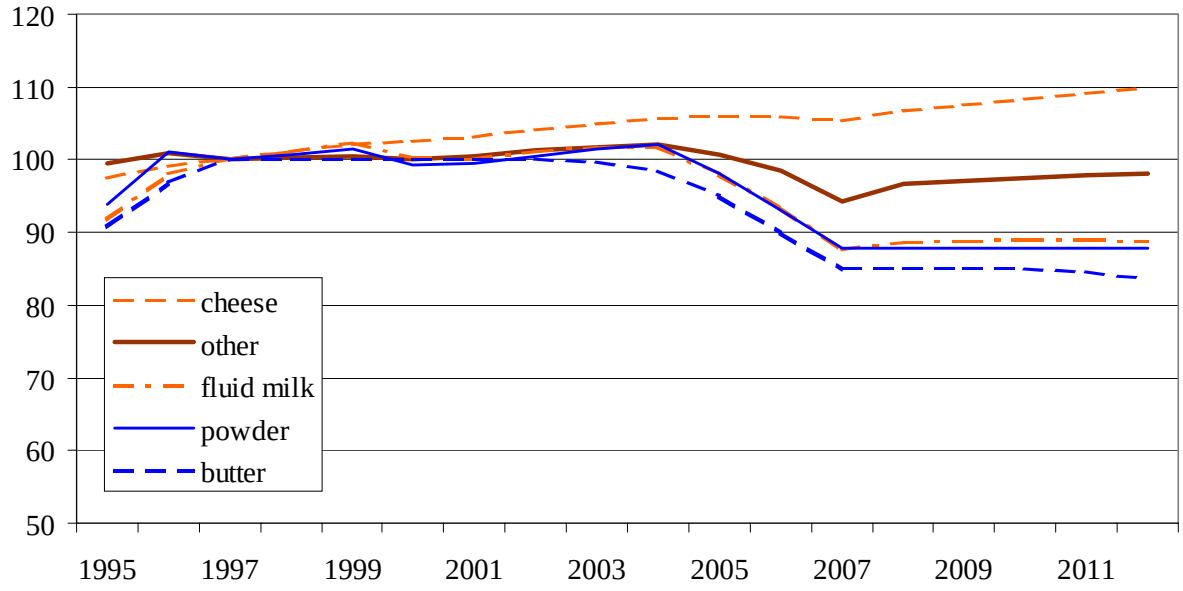


Figure 3.9: Prices of dairy products in EU-15 – Agenda 2000 – (1997= 100)



The aggregate supply function under Agenda conditions, contained in the models for EU-15, implies a quota rent of 29.1 €/ton for 2008 as opposed to 65.2 €/ton in 1997. This means that the value of the quota rent is cut by more than a half (Table 3.2 and Figure 3.2). It amounts to only 3.6 billion € in 2008 as opposed to 7.9 billion € in 1997. Also the share of quota rent in the value of milk production is halved and falls from 23.5 % (1997) to 11.8 % (2008). As against this, the producer rent (assuming the supply function being unchanged) remains constant, so that the decrease in sector incomes is not further strengthened from this side. A positive income contribution is, however, accomplished by direct payments from the public budgets, although this does not totally compensate for the price losses incurred. According to the model results the sector income from milk production (sum of quota rent, producer rent and direct payments) lies at 13.7 billion € in 2008, which is 9 % lower than the income in the year 1997.

Concerning the new direct payments provided for in Agenda, the subsidies payable on EU exports of milk produce are charging the EU budget although the realization of the Agenda will bring about some alleviation. The model results imply a reduction in the gap between domestic wholesale and world market prices from 169 €/ton to 128 €/ton (Table 3.3) and with the quantity of net exports remaining nearly the same, the decrease of budget expenditure towards export subsidies in the milk sector is approximately 23 % (from 959 million € to 735 million €). At least the absolute prices mentioned here and the budget expenditures could however be distorted by the model results referring to unprocessed raw milk. Actually, the budget expenditure for exporting milk products in 1997 amounted to 1.75 billion €, which is 1.8 times the expenditure calculated in the model.

Table 3.2: Value of production and rents associated with milk production in the EU (results from model calculations based on GAPsi)

subject	production quantity	producer-price	value of production	quota rent		producer rent	sum
	million t	Euro/t	billion Euro	Euro/t	billion Euro	billion Euro	billion Euro
situation in 1997							
with quotas	121,8	277,8	33,8	65,2	7,9	3,2	11,2
situation in 2008							
Agenda	125,3	246,7	30,9	29,1	3,6	3,2	9,8 [a]
abolition -s	127,7	221,2	28,2	0,0	0,0	7,6	7,6
abolition +s	130,9	210,7	27,6	0,0	0,0	8,8	13,4 [a]
08 vs. 97 (%)							
Agenda	2,8	-11,2	-8,7	-55,4	-54,1	0,0	-12,3
abolition -s	4,8	-20,4	-16,6	-100,0	-100,0	138,7	-31,4
abolition +s	7,5	-24,2	-18,5	-100,0	-100,0	175,5	19,7
08 vs. Ag. (%)							
abolition -s	1,9	-10,3	-8,6	-100,0	-100,0	138,7	-21,8
abolition +s	4,5	-14,6	-10,7	-100,0	-100,0	175,5	36,5
direct payments							
Agenda	117,5 [b]	25,0					2,9
aboliton +s	117,5 [b]	38,5 [c]					4,5

a) sum incl. the respective direct payments
b) calculation of payments based upon milk quotas of 1997
c) rate of payment = 60 % of the price decrease in the previous year

Figure 3.10: Producer prices, quota rents and payments in the EU milk sector (Euro/t) – Agenda 2000 – ("price" = producer price – quota rent)

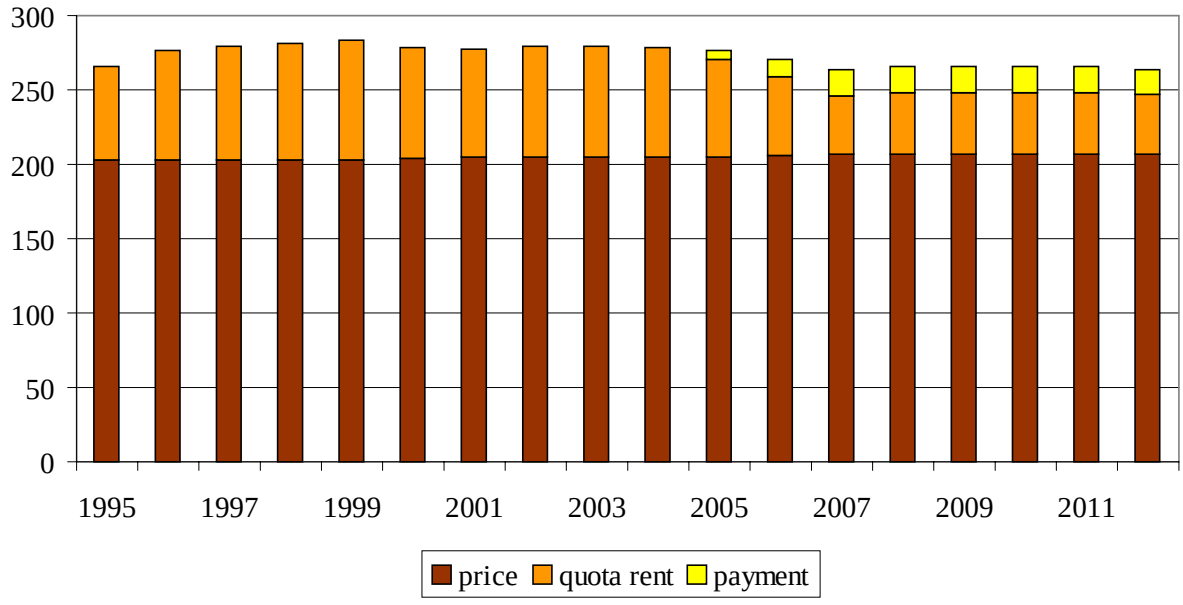


Table 3.3: Calculation of export subsidies (results from model calculations based on GAPsi)

		1997	2008		
subject	unit	base	Agenda	exit -S.	exit +S.
quantity of export	million t	5,7	5,7	7,5	10,4
price difference [a)]	Euro / t	168,9	128,3	102,6	92,9
export subsidy	billion Euro	1,0	0,7	0,8	1,0

a) EU wholesale price minus world market price

While the results of GAPsi strongly underestimate the export subsidies actually paid, MIPsi show figures (Table 3.4) which for 1997 are 40 % higher than the official ones. There is, however, a plausible explanation for both. In GAPsi it was not possible to differentiate between raw milk and processed milk products.

Table 3.4: Calculation of export subsidies (results from model calculations based on MIPsi)

		1997	2008	
subject	unit	base	Agenda	exit -S.
quantity of export				
fluid milk	million t	357,65	308,09	318,06
butter	million t	255,84	287,06	246,07
cheese	million t	360,59	276,15	324,72
SMP	million t	304,88	156,62	324,58
other dairy prod.	million t	674,66	506,06	662,26
price difference [a)]				
fluid milk	Euro / t	247,83	94,98	0,00
butter	Euro / t	2.402,56	1.753,63	1.443,10
cheese	Euro / t	1.985,78	1.925,50	1.822,94
SMP	Euro / t	843,00	254,19	135,39
other dairy prod.	Euro / t	1.241,07	942,81	923,28
export subsidy				
fluid milk	million Euro	89	29	0
butter	million Euro	615	503	355
cheese	million Euro	716	532	592
SMP	million Euro	257	40	44
other dairy prod.	million Euro	837	477	611
sum	million Euro	2514	1581	1602

a) EU wholesale price minus world market price

Therefore, the value added of milk products that is reflected in higher prices and at least partly in higher export subsidies could not properly be taken into account. The result is a

systematic underestimation of these expenditures. In MIPsi, on the contrary, a few milk products are discerned, but it has not been taken into consideration that some exports are made without subsidies (or are made at subsidy rates undercutting the actual price difference between EU and world markets). Thus, even if the pertinent export quantities and price differences were calculated correctly, the procedure must give rise to an overestimation of the budget expenditure.

3.3.1.1 Quota abolition without price compensation

Abolishing the milk quota regime means (*ceteris paribus*) that not only producer prices will considerably be reduced but also that demand for and production of milk products will somewhat increase. The price reduction is a consequence of the total quota rent falling away (Figure 3.11). However, the price reduction does not reach the full extent of the quota rent because rise in demand released by lower prices will to certain degrees counteract the price reduction. After the abolition of the quotas the EU can export larger quantities compared to the past, if not only the export protection is adjusted to the new price levels but also the amounts of export subsidy are reduced correspondingly. Moreover, there will be a tendency of increasing demand for EU milk products due to world wide lower prices, but to a large extent EU produce is substituting for production from regions of RoW.

Due to different sizes of price elasticities EU milk production will grow much stronger than EU consumption. The quantities available for export will therefore increase overproportionately (Figure 3.11). The narrowing of the price gap between EU and world markets supports the assumption that the quantity restrictions of the WTO agreement will continue to control subsidized EU milk exports while the budgetary restrictions will not become binding.

With complete removal of the EU milk quota regime the resulting price fall by 25.5 € as against the Agenda scenario is clearly smaller than the quota rent (29.1 €/ton). The liberalization of production will result in a 2.4 million ton extra milk supply, out of which only 0.6 million tons will be used in the domestic market. The total milk exports will increase to 7.5 million tons.

Referring to the different milk products, important developments are shown in Figures 3.12 to 3.15. Generally, the tendency of distinct price falls and larger production quantities is confirmed.

Figure 3.11: Supply of and demand for milk in the EU (abolitation of milk quotas, no subsidies, 2008)

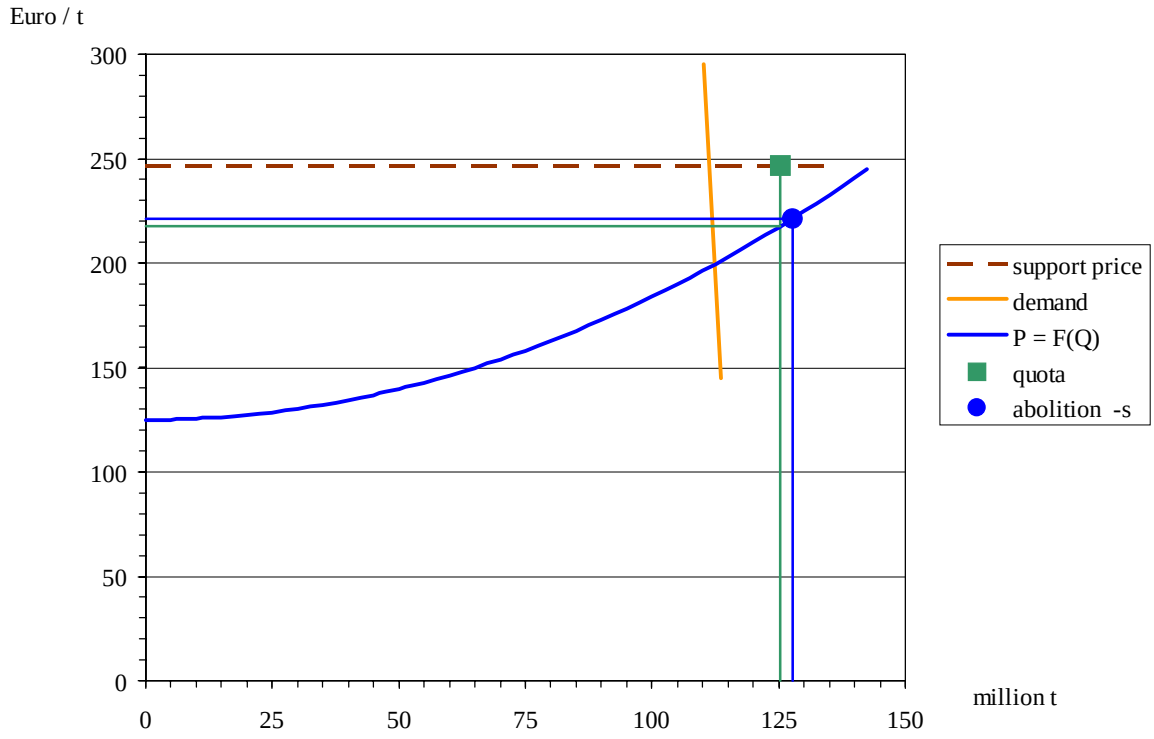


Figure 3.12: Milk production and producer prices in EU-15 – Quota abolition – (1997= 100)

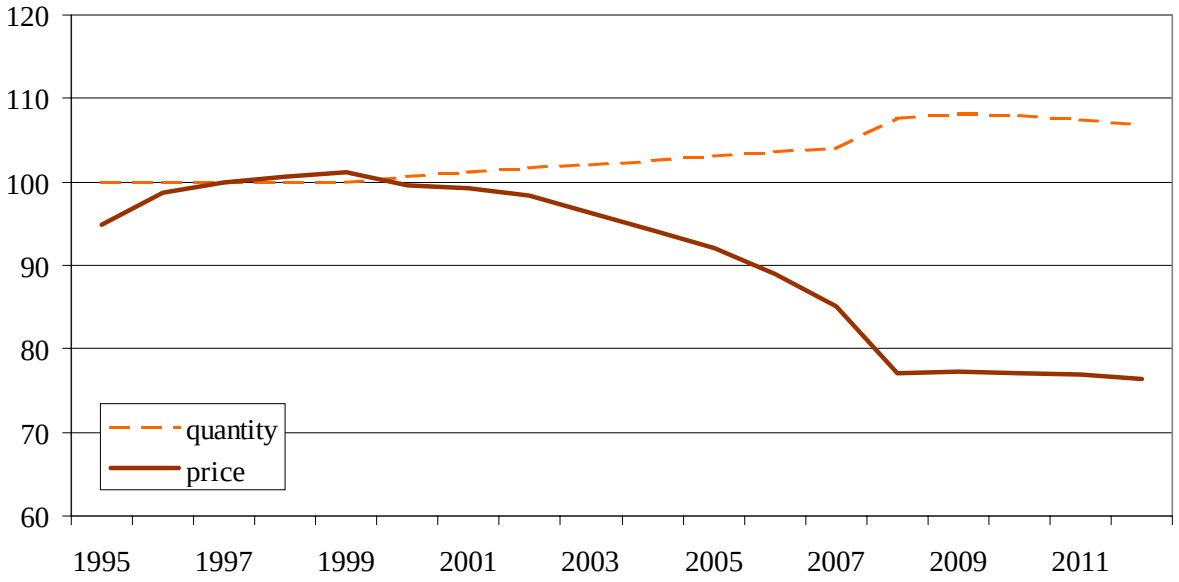


Figure 3.13: Raw milk and component prices in EU-15 – Quota abolition – (1997= 100)

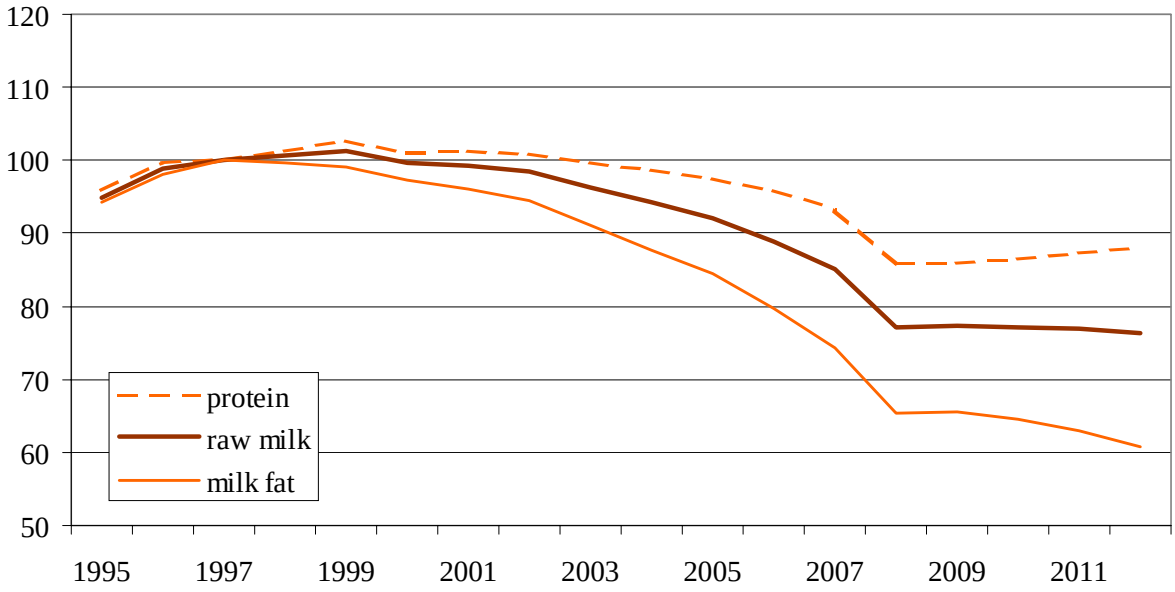


Figure 3.14: Price od dairy products in EU-15 – Quota abolition – (1997= 100)

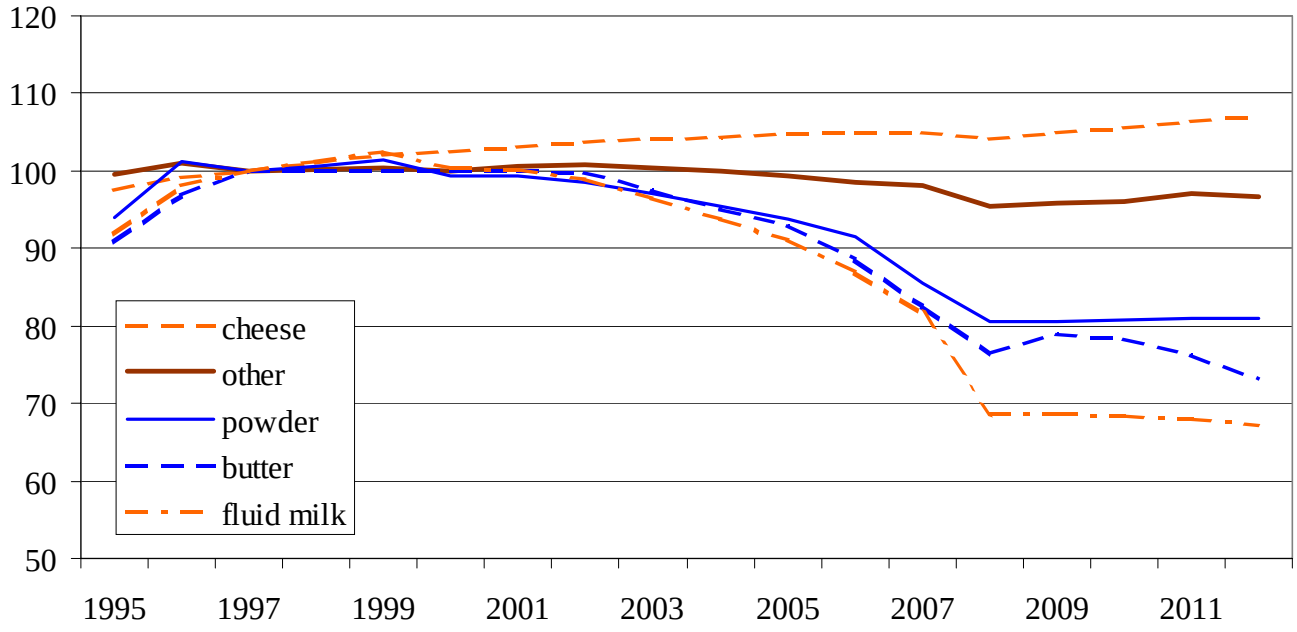
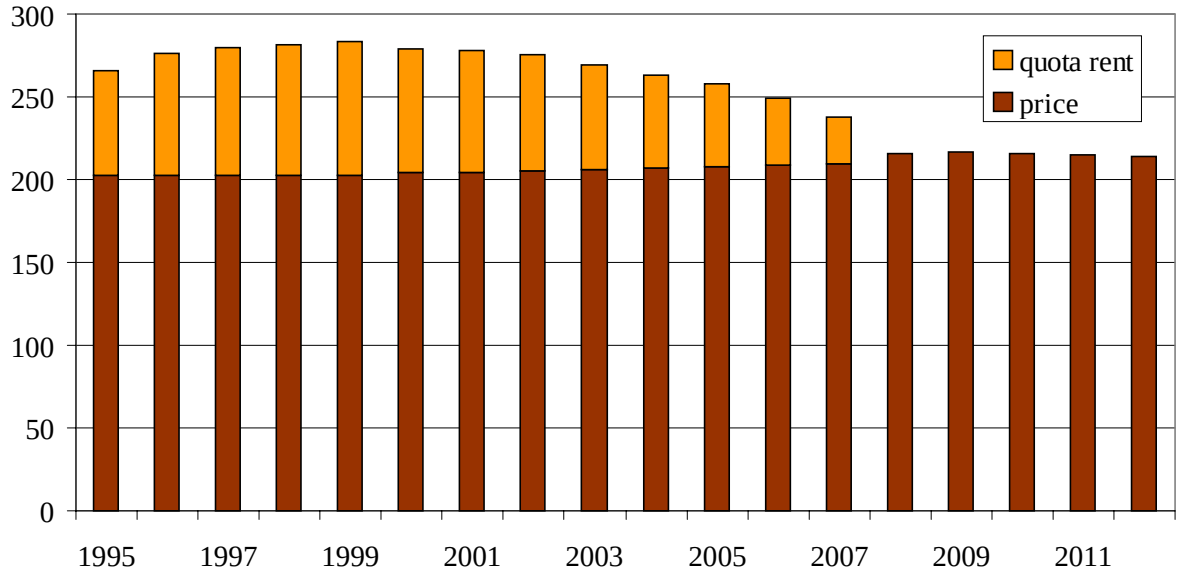


Figure 3.15: Producer prices and quota rents in the milk sector (Euro/t)
– Quota abolition –



NB: "price" = producer price – quota rent

As already depicted in Table 3.2, the value of EU milk production declines following the quota abolition without direct payments from 30.9 billion € to 28.2 billion € (-8.6 %). With regard to this, the more pronounced fall in the producer price by 10.3 % is partly compensated by a slight expansion of production (+1.9 %). For the producers, the quota abolition first of all means to lose the total quota rent of 3.6 billion € (11.8 % of the value of production) which had remained under Agenda conditions. Demand driven, counter acting price movements and the production expansion linked to it will cause the producer rent to increase from 7.1 billion € to 7.6 billion € (+8.0 %). In total, the income derived from milk production falls from 13.7 billion € (Agenda with price compensation) to 7.6 billion € (abolition without price compensation).

Abolishing quota rents is advantageous to the consumers. That is, the domestic consumers benefit almost proportional to their share in EU production and at a higher level of consumption they attain a slight increase in their welfare. According to the model results the increase in consumer income adds up to around 3.0 billion €.

In spite of the clear increase in export quantities, expenditures on export subsidies for milk products hardly increase. To judge from the model GAPsi the export subsidy payable per unit decreases corresponding to the price difference (EU wholesale price minus world market price) from 128.3 €/ton to 102.6 €/ton (Table 3.3) and also MIPsi thoroughly testifies smaller price differences for the different milk products (Table 3.4). The varying amounts of export subsidy computed by the two models is already explained above (see Chapter 3.4.1).

The model results support the expectation that in the case of a quota abolition without price compensation, the quantity restrictions of the WTO agreement relevant to subsidized exports will remain binding rather than the budget restriction becoming relevant.

3.3.1.2 Quota abolition with (partial) price compensation

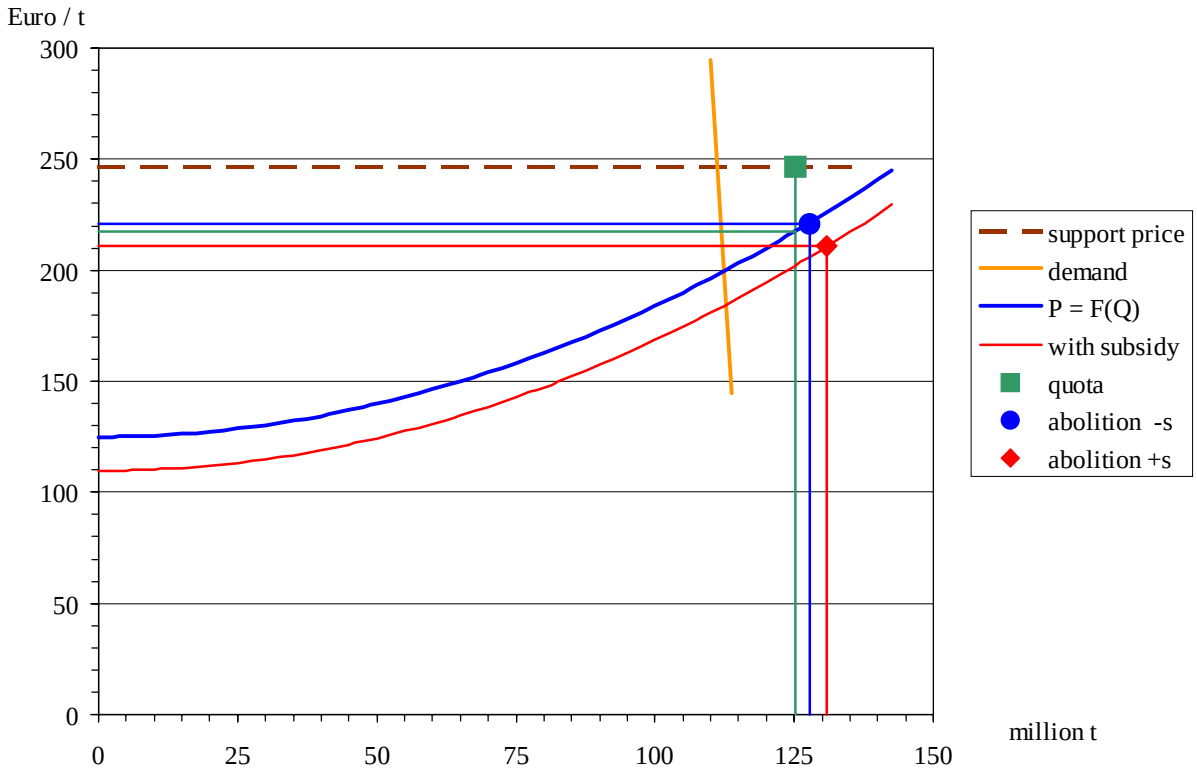
If the price reduction resulting from the abolition of quotas is (partly) compensated through direct payments to the producer, it is not only the level of compensation which matters in view of the effects on the market, but also the way the payments are made, i.e. their production effectiveness. In this regard direct payments, which are tied to current production have a distinctly larger effect on output than (in the other extreme) a lump-sum payment with the amount being derived from historical production (capitalized annual payments) and the usage being left to the recipient's decision (see Chapter 2.6).

In the models it is assumed that compensatory payments are made annually in proportion to the individual milk quotas of 1997 and at a level of 60 % of the price reduction incurred. Moreover, a production effectiveness of 0.4 is assumed. That means, that 40 % of the payments made are affecting production while 60 % can be seen as de-coupled income transfers. In other words, an amount equal to 24 % of the original price difference is taken by the producers as a price subsidy while 36 % are considered to compensate for the loss in income without influencing production and 40 % are left uncompensated.

In macro-economics terms, the price subsidy part of the compensatory payment shifts the supply curve downwards by the same amount (24 % of the original price decrease, c.f. above). Thus, judging from the result, this part of the subsidy is effectively used for defraying production costs so that the producers are able to offer milk more cheaply (Figure 3.16). Also in this case consumers will react on falling prices by mildly increasing demand and this will let the prices make good for at least somewhat of the fall they would otherwise have experienced, namely by the full extent of the production effective part of subsidy (equal to the amount by which the supply function was shifted).

In the light of the politically intended income compensation it has to be stated that depending on the arrangements made in the allocation of the subsidy, a more or less important part of the budget expenditure fails to achieve its objective. This part will be advantageous to the domestic consumers instead of the producers. For the public budget the situation is clear only to the extent, that the total income compensation must be paid from budgetary resources. The situation with regard to exports is less clear in the beginning. Although the budget will take profit in lower rates of export subsidies, they nevertheless apply to larger quantities.

Figure 3.16: Supply of and demand for milk in the EU (abolition of milk quotas ± subsidies, 2008)



The consequence of the quota abolition with a partial compensation of the price decrease incurred is that EU milk production in the equilibrium reaches 130.9 million tons (+4.5 % as compared to the Agenda). In spite of the strong increase in volumes, the value of milk production decreases to 27.6 billion € due to lower prices (-10.7 % as against Agenda).

Under conditions of this scenario the producers lose all of the quota rent. The producer rent will now be 8.8 billion € instead of 7.6 billion € as when the quota regime is abolished without any price compensation. Thus, the decrease in income from milk production amounts to 0.3 billion € or 2.5 % vis-a-vis Agenda conditions. As compared to 1997, the sector income from milk production is lowered by 11.4%. Only in comparison to the quota abolition without price compensation there is an increase. It amounts to 4.5 billion € (almost +60 %).

For a direct payment of 38.5 €/ton of milk (including slaughter payments for cows) as in the present case, 15.4 €/ton affect production. It is evident from the demand/supply constellation assumed in the model that the consumers largely benefit from the subsidies. Because of the magnitude of demand and supply elasticities in the model the production effective part of the subsidy is apportioned to consumers and producers at a ratio of 27 to 73. That means, due to the subsidy the producer price for milk will fall by 10.46 €/ton, it

is by the same amount that the price component of the consumer rent will rise. The benefit falling to the consumers add up to around 27 % of the total direct payment.

The consumers take profit not only from lower prices at unchanged milk consumption but also from the price affected increase in consumption of this product[5]. As the demand curve for milk (products) takes a rather steep course, the effect on volume remains marginal. The increase in the consumer income amounts to 4.2 billion € in the model, of which only 14 million € (0.3 %) are attributable to the volume effect.

[5] Furtheron, there are increased consumption opportunities resulting from increased real incomes due to lower prices for milk and dairy products, those effects have not been taken into consideration.

4 Sectoral and regional impacts in Germany

In this chapter the sectoral and regional impacts of an abolishment of the milk quota regime on the German agricultural sector are discussed. The sectoral effects are assessed with the farm group model FARMIS; they are supplemented with the calculations of the farm model BEMO. The representation of the regional effects is based on the results of the regional model RAUMIS.

4.1 Description of the reference situation

The Agenda 2000 reform will reduce the support prices for milk by 15 % in three stages starting from the financial year 2005/06. In Germany, the milk quotas will be raised by 1.5 % in steps of 0.5 %. Compensation payments tied to the milk quotas (relating to the reference quantities in 1999) will amount to € 24.95 per ton of milk quota in 2007/08. Within the framework of the reform a slaughter premia amounting to € 102.77 will be paid for milk cows. The reduction of the support price for milk is not fully transmitted to the producer's price in the reference scenario and the resulting revenue loss is compensated to the extent of approx. 70 % by the milk premia. In the reference situation the competitiveness of milk production increases in comparison to the base year mainly due to the expected increase in milk efficiency. Indicators for the improved competitiveness of milk production in the reference situation are a) higher dual values of the milk quotas, b) the full utilisation of the increase in quota by 1.5 % until the financial year 2007/08. This suggests that despite the Agenda 2000 reforms, the problems related to the quota regime, e.g. the financial burden on active milk producers and the hindrance of structural change, will be further aggravated.

Simulations based on FARMIS show that during the analysed time period the number of dairy cows falls by 17.6 % to approx. 4.2 million animals because of efficiency gains in milk production. Associated with this development, the extensive use of permanent grassland becomes more widespread and beef production falls by almost 7 %. In comparison to the base year the aggregated net value added[1] increases by approx. 10 % which can be mainly attributed to an expansion of pig and poultry production, reduced inputs and depreciation and to an increase of the production value due to favourable price and yield developments in crop production.

[1] The net value added at factor costs corresponds to the farm income, i.e. the profit of a lease free or loan free farm without contract labour. From this, the costs of the quasi-fixed factors land, labour and capital, irrespective of whether they are in the ownership of the farmer or not, have to be covered.

The reference situation for the regional model RAUMIS is also relating to 2007/08, while the base year is 1999. Within the model the Agenda 2000 ceilings for national special and slaughter premia for beef under are taken into account. Young animal balances are equalised by price adjustments, so that it does not come to any unrealistic young animal surpluses or deficits. These adjustments influence especially the amount of beef supply. The number of milk cows decreases by 16.3 % to 3.99 million animals despite of quota increase of 1.5 % due to the high increase of efficiency. The number of dairy cows is a little less than shown in the calculations with FARMIS, which is attributable to the strong rising milk efficiency in the base year 1999. The supply of beef reduces by 10 % from 1.39 million tons to 1.25 million tons in the year 2008. The net value added in terms of factor costs improves by almost 8 % referred to the base year balance.

4.2 Supply and income effects of an abolishment of the milk quota regime at the sector level

The consequences of an abolishment of the milk quota regime for the two scenarios *milk premia* and *grassland premia* are discussed for milk price reductions of 22, 25 and 30 %. With respect to the income effects it needs to be mentioned that quota costs (or rather the elimination of quota cost) are not taken into account in this chapter due to the lack of sufficient data. This aspect will be discussed on the basis of the results of the representative farm model BEMO (see Chapter 5).

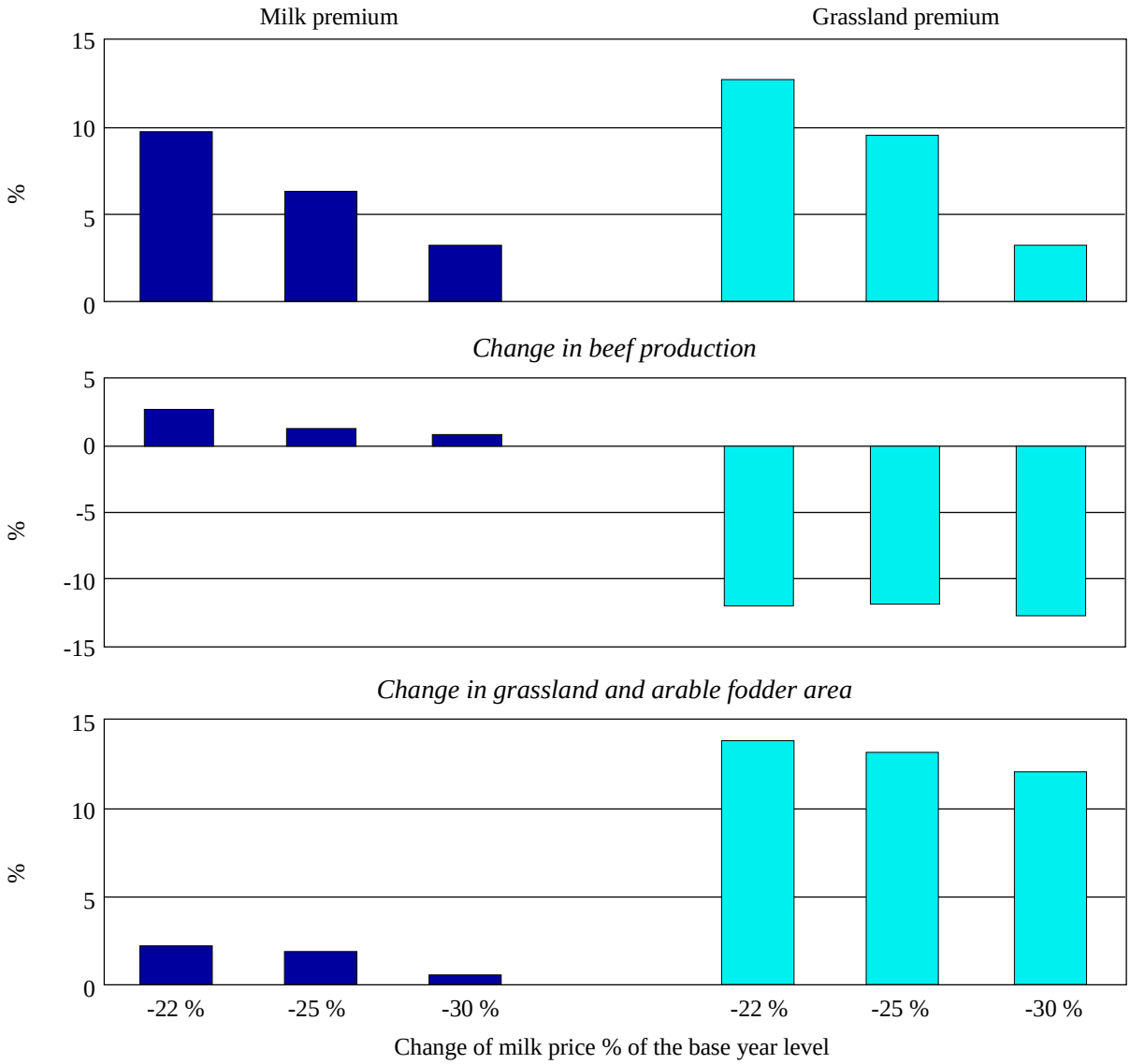
4.2.1 Milk premia

The central principle of this system is that the milk quotas are abolished and the payment of milk premia in 2008 is limited to farm specific quantities which refer to a reference situation. As long as the production of a farm is less than or equal to this reference quantity, the producer‘s incentive price, which is determining operational decisions, is the sum of the milk price plus the milk premia, whereas any production exceeding the individual reference quantity will receive the milk price only.

With the abolition of the milk quota regime and partial compensation of price reductions by a milk premia of 3.32 Cents/kg, the milk production expands for all examined price variations (see Figure 4.1 and Table 4.1). The supply increases by approx. 10 % in the scenario in which the reduction of milk price amounts to 22 % (Mp_22). The increase is correspondingly smaller for higher price reductions. With a price reduction of 30 % the milk production increases by only 3 %. Calculations based on the farm model BEMO show similar supply reactions for the scenario Mp_22. However, in comparison to FARMIS, the decrease in production is significantly larger for higher price reductions (Mp_25

or Mp_30). With a price reduction of 30 % the production quantity falls slightly below the reference quantity (see Table 5.4). The different slope of the supply curve in the two models is responsible for this fact (see Figure 4.2), especially in the range of producer price reductions between 25 and 30 %. Due to the limitation of the milk premia to the farm individual reference quantity the aggregate supply curve deviates slightly downwards. However, due to the aggregation error the supply curve of the farm group model is less elastic in some ranges than that of the farm model BEMO, where supply responses as a result of price changes are higher.

Figure 4.1: Sectoral impacts of milk and grassland premia on the production



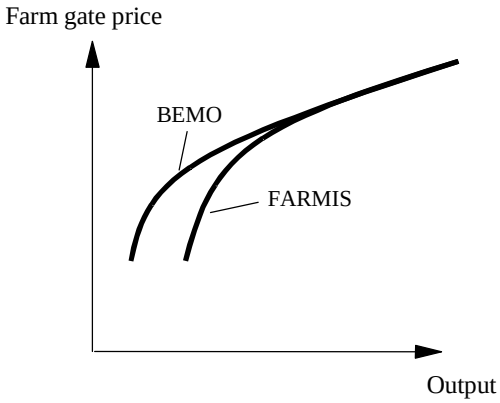
Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

Table 4.1: Change of milk and beef production as well as of income and direct payments in Germany

		Germany						
Scenario		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.22	0.24	0.23	0.22
Average milk yield	kg/year	6872	6904	6904	6896	6904	6903	6903
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	28682	*9.8*	*6.3*	*3.2*	*12.7*	*9.5*	*3.3*
Beef production	t	1449691	*2.7*	*1.3*	*0.9*	*-12.0*	*-11.9*	*-12.8*
Milk cows	Units	4173792	*9.2*	*5.8*	*2.8*	*12.2*	*9.0*	*2.9*
Bulls for fattening	Units	2273917	*0.4*	*-0.8*	*0.0*	*-30.8*	*-28.8*	*-27.9*
Acreage permanent grassland (incl. fodder crops)	1000 ha	4933	*2.3*	*1.9*	*0.6*	*13.8*	*13.2*	*12.1*
Acreage Grandes Cultures	1000 ha	9368	*-0.1*	*0.3*	*0.6*	*-5.3*	*-4.9*	*-4.4*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	7941	*-3.5*	*-7.1*	*-12.9*	*-5.7*	*-8.6*	*-15.3*
Net value added per unit manpower	€	21328	*-6.1*	*-8.9*	*-14.1*	*-7.5*	*-9.8*	*-15.1*
Direct Payments								
Beef premia (total)	Mio. €	1659	1907	1896	1895	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	852	1101	1096	1091	-	-	-
Premia Grandes Cultures	Mio. €	3310	3306	3318	3329	3135	3148	3164
Grassland premia	Mio. €	-	-	-	-	1982	1973	1946
Premia (total)	Mio. €	4982	5222	5223	5233	5119	5120	5119

Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

Figure 4.2: Schematic illustration of supply functions in FARMIS and BEMO

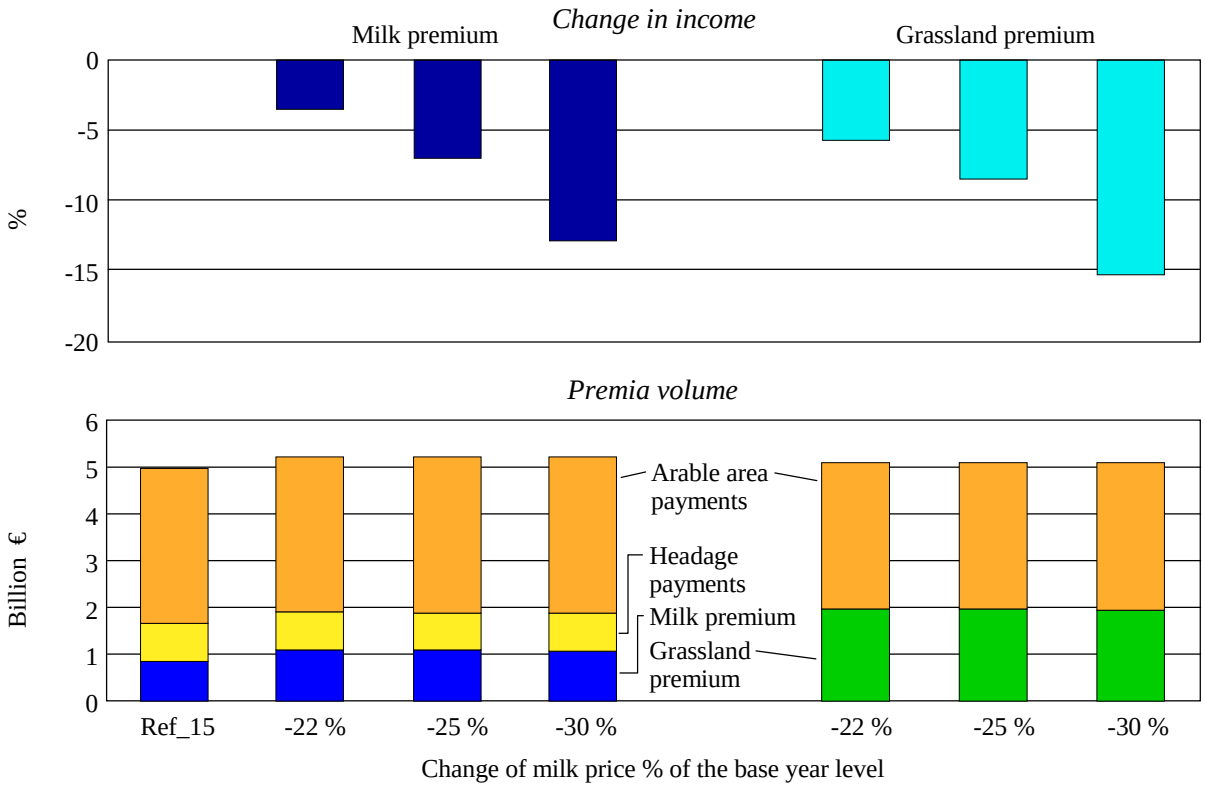


The development of beef production is largely determined by the change of the supply of the by-product ‘cow-meat’. In the farm group model the beef production increases by 0.3 % for each percent of increase in the number of dairy cows; an analogous reaction is observed for the individual farm model BEMO (see Chapter 5.3). In spite of the expan-

sion of milk production no noteworthy changes in total fodder area appears. The increased demand for fodder is managed by an intensification of the permanent grasslands.

In the scenarios, the reduction of milk prices is partly compensated by an increase of the level of the milk premia. Thus direct payments related to milk production increase (see Table 4.1 and Figure 4.3). The slaughter premia included in the figures correlates directly with the increase in the number of dairy cows. In comparison to the reference the direct payments for the slaughtered old cows increase by € 12.8 million (Mp_22), € 7,7 million (Mp_25) and € 2 million (Mp_30) respectively. The aggregated milk premia increase from € 705 million by 34 % to € 942 million for all scenarios because of the ceiling that exists for the milk premia volume.

Figure 4.3: Sectoral impacts of milk and grassland premia on income and premia volume



Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

The sectoral income[2] is reduced by 3.5 % in the base scenario (Mp_22), i. e. € 255 million. The relative income losses strongly increase for larger milk price reductions because

[2] Net value added at factor costs.

higher price reductions are not mitigated by a further increase of premia. In the scenario Mp_25 income losses of 7 % and in Mp_30 of 13 % are to be expected.

4.2.2 Grassland premia

In the following chapter, the sectoral production and income effects of a transformation of all milk and livestock premia to a grassland premia are examined. The uniform grassland premia, which is granted not only for permanent grasslands but also for arable fodder area (excluding maize for silage), amounts to € 353/hectare. Grassland premia in the described form are not fully de-coupled from production; they act as a subsidisation of the grassland use. At the specified level the grassland premia reduce the distortion of competition between grassland use and maize for silage. Further on they contribute to the reduction of the competitive distortions between male and female cattle, extensive and intensive production processes as well as between beef and milk production induced by the current animal headage premia system. Hence significant changes are to be expected with respect to beef production and grassland use (see Table 4.1 and Figure 4.1).

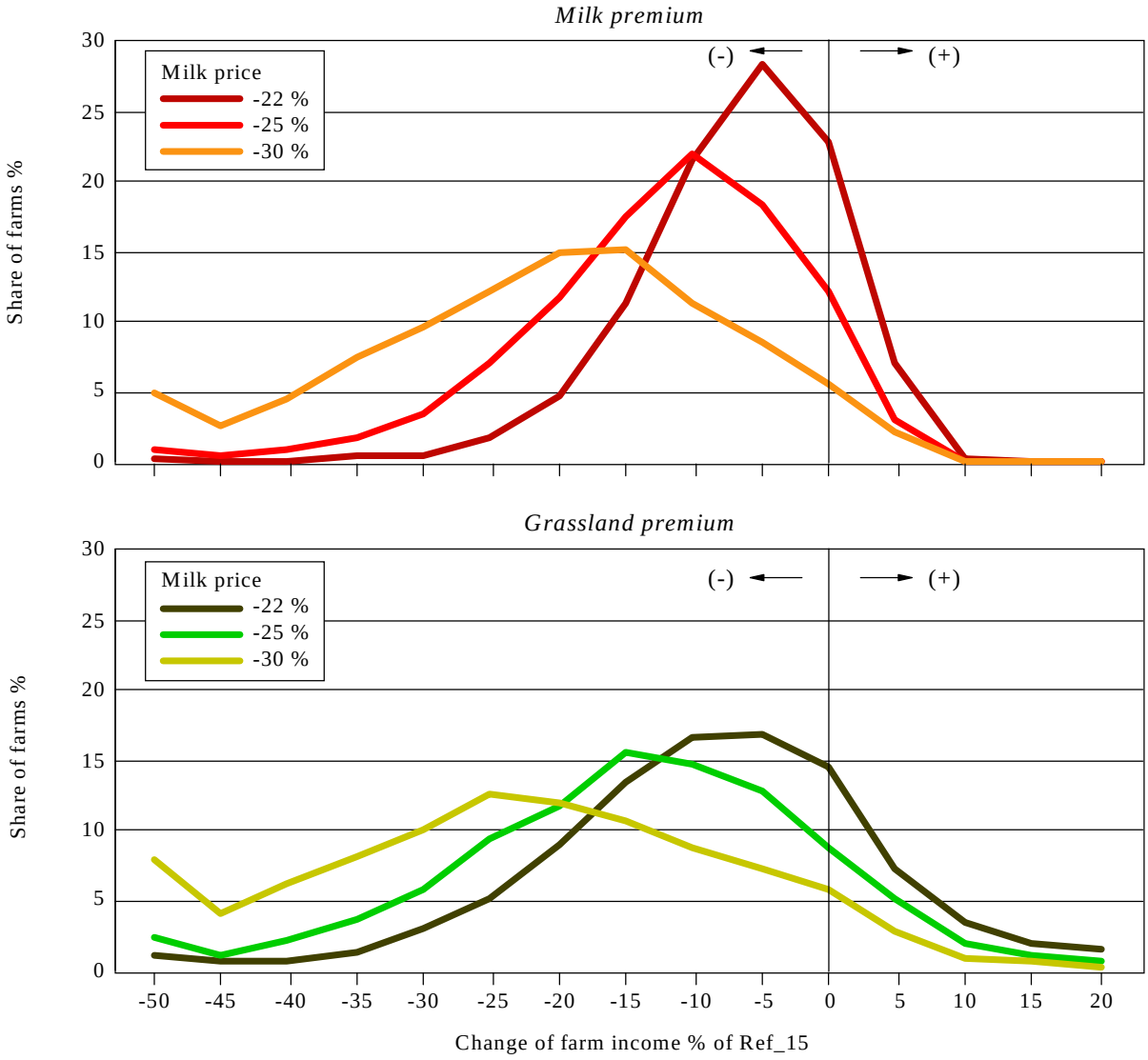
At the sector level, milk production is 3 percentage points higher for the scenarios Gp_22 and Gp_25 than in the comparable scenarios with milk premia. For a reduction of the producer price by 30 %, the increase of the production is similar to the corresponding milk premia scenario (+3.3 %). Beef production is considerably reduced, which can be attributed to the substantial reduction in bulls fattening amounting to 30 % (Gp_22). The relative competitiveness of beef and milk production is shifted in favour of milk production. Thus the competitiveness of milk production increases due to the payment of a grassland premia.

Further shifts in competition occur in crop and fodder production. While the grassland premia increases the relative superiority of fodder cultivation, the level of other cropping activities is reduced. The expansion of total fodder area amounts to approx. 11 to 13 % (see Figure 4.1).

For the farms covered by the farm group model the income situation worsens through the introduction of a grassland premia. In comparison to the scenarios ‘Milk Premia’ income is up to 2 to 3 percentage points lower (see Figure 4.3). The cause for this difference in the scenarios is the reduction of total premia volumes: While the amount of grassland premia is computed such that the sectoral premia volume remains constant in the scenarios, the direct payments in FARMIS slightly decrease in total. This is caused by the fact

that only 85 % of the sectoral permanent grassland area is covered[3]. Hence the farms represented in the farm group model are under-compensated through the grassland premia.

Figure 4.4: Frequency distribution of income changes following the phase out of the quota - scenarios 'milk and grassland premia'



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

Grassland premia lead to significant distribution effects on incomes. Figure 4.4 shows the frequency distribution[4] of the income changes of farms in the scenarios grassland premia

[3] The reason is the relative high share of grassland areas in farms which are not represented because of the cut-off limit of € 7669 standard farm income in the national FADN.

[4] For the frequency distributions the aggregation factors are not weighted.

in comparison to milk premia. The distribution curves take a flat course with grassland premia and shows stronger fluctuations in the area of positive and negative income changes. From this it follows that the share of the *winners* in comparison to the milk premia scenario is indeed bigger but also the share of the farms with relatively high losses. The differences are attributed to the fact that the milk premia transfer payments are closely correlated with the milk production of the farms, while grassland premia are paid uniformly all over the country. The distribution effects of incomes could be diminished by differentiating grassland premia regionally (analogous to the premia for arable crops), for example with respect to grassland yields or stocking rates. This is insofar of importance as a regional differentiation has only negligible effects on the milk supply (CYPRIS et.al. 1997).

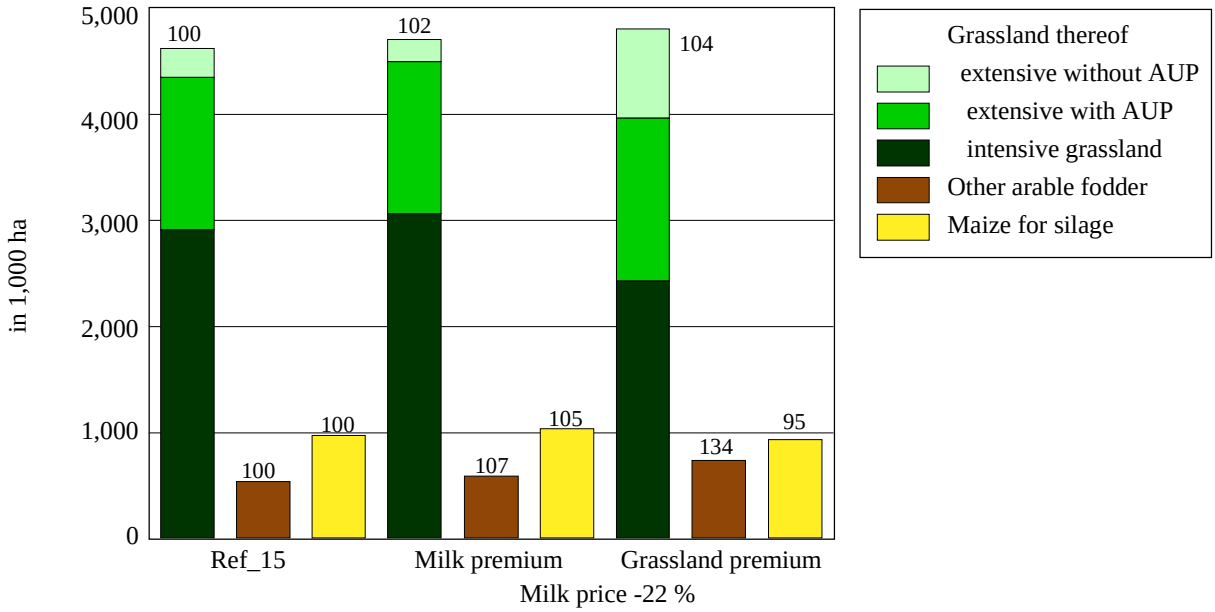
In the model RAUMIS a more extensive grassland usage and an expansion of field and clover grass is observable while maize for silage loses its importance in comparison to the scenarios with milk premia (see Figure 4.5). The milk production in RAUMIS expands similar to the results in FARMIS (see Figure 4.6). The young animals (calves) balance is equalised through a sharp fall in calf and fodder prices. Because of this, only negligible reductions in beef production by approx. 2.6 % are to be expected, which result from a slight reduction in the rearing of bulls as well as the number of heifers for fattening and from a growth of fattened calves. As the higher cattle stock competes for fodder with the dairy cows, a somewhat lower expansion of milk production is observable compared to FARMIS (see Table 4.2).

The percentage change in income is lower in RAUMIS than in FARMIS: In contrast to FARMIS, horticulture, fruit and wine production, which makes up a substantial share of the sectoral income, are fully included. Thus, with income changes confined to the grazing livestock activities, relative sectoral income reductions are comparably smaller.

The sectoral income falls somewhat less strongly than in the corresponding scenarios with milk premia. The net value added at factor costs is approx. 1.5 to 2 percentage points higher than in the scenarios with milk premia.

Thus, in comparison to FARMIS, the income development calculated by RAUMIS is somewhat more favourable. This is due to two effects: Firstly, the sectoral grassland area covered by RAUMIS is higher, especially in the south and in the mountainous regions of central Germany. Secondly, in the regional model the de-coupling of direct payments leads to a stronger substitution of less economic cattle activities with milk production in some regions. Especially suckler cows, which are no longer supported in the scenario grassland premia through a direct special premia, are reduced by up to 50 %. These great changes in production forecasted by the regional model represent a situation which can be expected in the long-term. In reality, the fodder areas would be used only through the growth of those farms specialised in milk production.

Figure 4.5: Development of fodder area utilisation



Source: RAUMIS, own calculations. Osterburg_2001-12-20

4.3 Supply and income effects at the regional level

In this chapter the focus is on the regional effects of milk and grassland premia. The northern region comprises the federal states Schleswig-Holstein, Lower Saxony and North Rhine–Westphalia. The central region comprises Hesse, Rhineland-Palatinate and Saarland. Bavaria and Baden–Wuerttenberg form the southern region and the ‘new’ Laender constitute the region east.

4.3.1 Milk premia

The results of the model FARMIS highlight considerable differences between the regions (Table 4.2). In the region 'north', milk production expands by more than 15.9 % (scenario Mp_22). Its high share of the German milk production (37 %) and a above average level of milk yield (approx. 7,490 kg/cow) indicate a competitive advantage for this region, namely due to favourable regional conditions and farm structure. Even with a milk price reduction of 30 % (Mp_30) the milk supply in this region increases by almost 9 %. The income reduction is significantly lower than the sectoral average.

The central region represents less than 7 % of the sectoral milk production. In the scenario Mp_22 the production in this region expands by only 5.5 %.

Table 4.2: Change of milk and beef production as well as of income and direct payments by regions (part 1)

		North						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.26	0.23	0.23	0.21	0.23	0.23	0.21
Average milk yield	kg/year	7486	7490	7497	7491	7491	7492	7492
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	10638	*15.9*	*12.3*	*7.8*	*18.0*	*14.5*	*8.7*
Beef production	t	659837	*3.6*	*1.9*	*1.7*	*-16.0*	*-15.7*	*-15.6*
Milk cows	Units	1421068	*15.9*	*12.1*	*7.7*	*17.9*	*14.4*	*8.6*
Bulls for fattening	Units	1224809	*1.3*	*-0.2*	*0.4*	*-30.0*	*-28.4*	*-26.8*
Acreage permanent grassland (incl. fodder crops)	1000 ha	1730	*1.9*	*0.9*	*0.4*	*5.4*	*5.2*	*5.3*
Acreage Grandes Cultures	1000 ha	2714	*-1.2*	*-0.6*	*-0.3*	*-3.5*	*-3.4*	*-3.5*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	4136	*-1.2*	*-4.1*	*-8.7*	*-4.7*	*-6.4*	*-12.8*
Net value added per unit manpower	€	30416	*-5.0*	*-6.9*	*-10.6*	*-5.7*	*-7.2*	*-12.1*
Direct Payments								
Beef premia (total)	Mio. €	711	811	805	805	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	311	407	405	403	-	-	-
Premia Grandes Cultures	Mio. €	980	967	974	977	945	946	944
Grassland premia	Mio. €	-	-	-	-	501	500	496
Premia (total)	Mio. €	1694	1780	1780	1784	1589	1589	1588

		Centre						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.25	0.24	0.22	0.25	0.24	0.22
Average milk yield	kg/year	6793	6800	6798	6799	6787	6786	6786
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	1952	*5.5*	*3.1*	*0.7*	*9.8*	*5.9*	*-0.2*
Beef production	t	92949	*0.0*	*0.0*	*-0.3*	*-11.6*	*-12.5*	*-13.8*
Milk cows	Units	287347	*5.4*	*3.1*	*0.6*	*9.9*	*6.0*	*-0.1*
Bulls for fattening	Units	137658	*-1.0*	*-0.4*	*0.0*	*-28.9*	*-28.7*	*-28.3*
Acreage permanent grassland (incl. fodder crops)	1000 ha	454	*0.5*	*0.0*	*-0.6*	*7.7*	*7.4*	*6.7*
Acreage Grandes Cultures	1000 ha	700	*-0.4*	*-0.1*	*0.1*	*-5.0*	*-4.8*	*-4.4*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	466	*-6.0*	*-10.2*	*-16.8*	*1.7*	*-3.1*	*-10.4*
Net value added per unit manpower	€	18158	*-6.5*	*-10.5*	*-16.8*	*1.4*	*-2.7*	*-8.9*
Direct Payments								
Beef premia (total)	Mio. €	113	128	129	128	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	58	75	74	74	-	-	-
Premia Grandes Cultures	Mio. €	228	227	228	228	217	217	219
Grassland premia	Mio. €	-	-	-	-	318	318	316
Premia (total)	Mio. €	343	356	357	357	390	390	390

Table 4.2: Change of milk and beef production as well as of income and direct payments by regions (part 2)

		South						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.22	0.24	0.23	0.22
Average milk yield	kg/year	6233	6240	6236	6241	6234	6237	6237
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	10266	*3.3*	*0.4*	*-0.5*	*4.6*	*2.5*	*-3.1*
Beef production	t	491296	*1.6*	*0.3*	*0.5*	*-12.0*	*-11.4*	*-12.7*
Milk cows	Units	1646917	*3.2*	*0.4*	*-0.6*	*4.6*	*2.5*	*-3.1*
Bulls for fattening	Units	756970	*-0.5*	*-1.6*	*-0.6*	*-30.8*	*-27.5*	*-27.4*
Acreage permanent grassland (incl. fodder crops)	1000 ha	1501	*4.7*	*5.2*	*2.6*	*20.5*	*19.7*	*17.9*
Acreage Grandes Cultures	1000 ha	2118	*3.6*	*4.0*	*4.9*	*-5.9*	*-5.0*	*-3.8*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	2000	*-6.7*	*-11.5*	*-18.7*	*-14.9*	*-18.9*	*-26.1*
Net value added per unit manpower	€	17322	*-9.0*	*-13.0*	*-20.1*	*-16.7*	*-19.8*	*-25.8*
Direct Payments								
Beef premia (total)	Mio. €	571	655	652	652	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	308	394	393	391	-	-	-
Premia Grandes Cultures	Mio. €	738	763	766	773	693	700	709
Grassland premia	Mio. €	-	-	-	-	639	637	622
Premia (total)	Mio. €	1312	1421	1421	1428	1332	1334	1334
		NBL						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.26	0.24	0.23	0.21	0.24	0.23	0.21
Average milk yield	kg/year	7118	7121	7122	7122	7118	7118	7118
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	5826	*11.2*	*6.7*	*1.9*	*18.4*	*13.7*	*6.0*
Beef production	t	205609	*3.7*	*2.1*	*0.2*	*1.2*	*-0.6*	*-3.4*
Milk cows	Units	818460	*11.2*	*6.7*	*1.9*	*18.4*	*13.7*	*6.0*
Bulls for fattening	Units	154481	*-1.5*	*-1.0*	*-0.6*	*-39.0*	*-38.8*	*-38.2*
Acreage permanent grassland (incl. fodder crops)	1000 ha	1248	*0.7*	*0.1*	*-0.9*	*19.5*	*18.3*	*16.5*
Acreage Grandes Cultures	1000 ha	3836	*-1.3*	*-1.1*	*-1.1*	*-6.3*	*-6.0*	*-5.4*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	1339	*-5.0*	*-9.0*	*-15.6*	*2.3*	*-2.0*	*-8.5*
Net value added per unit manpower	€	14065	*-6.7*	*-10.1*	*-15.8*	*-1.0*	*-4.5*	*-9.8*
Direct Payments								
Beef premia (total)	Mio. €	263	312	311	309	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	174	226	224	223	-	-	-
Premia Grandes Cultures	Mio. €	1363	1348	1350	1350	1280	1285	1293
Grassland premia	Mio. €	-	-	-	-	523	519	512
Premia (total)	Mio. €	1634	1664	1665	1664	1807	1807	1807

Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

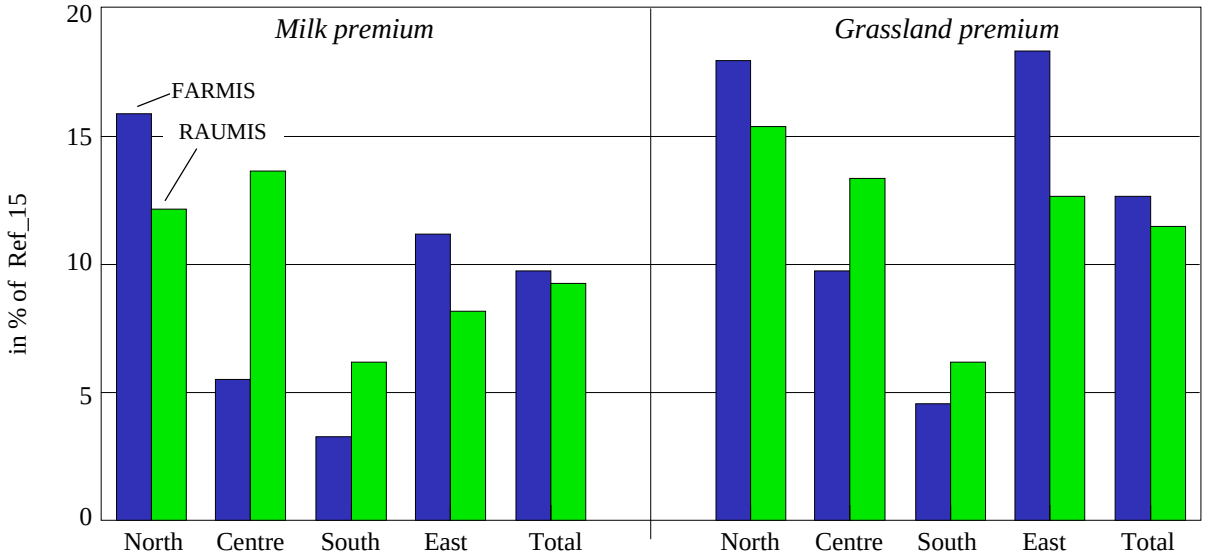
In the region ‚south', which accounts for 35 % of the total milk production in Germany, the expansion of supply in the scenario Mp_22 amounts to 3.3 %. Higher price reductions lead to a reduction in supply in comparison to the reference. The low level of dairy yields is certainly one of the decisive factors for this reaction. The milk production per cow is 6200 kg/year, which is distinctly below the national average.

In the eastern region the milk production is expanding by 11 %. The large size of dairy farms and a dairy yield per cow which is comparable to the northern region lead to a comparatively high competitiveness.

The regional supply reactions show clear differences between the models FARMIS and BEMO. These differences can be traced back to the different assumptions on the planning period. Especially in regions with a large share of small holdings, the total cost relevant for decision making in FARMIS cannot be covered anymore by all farms at lower milk prices.

According to the results of RAUMIS, a clear expansion of milk production in the scenario Mp_22 by 12 % in the northern and by 8 % in the eastern region occurs (Figure 4.6).

Figure 4.6: Regional development of milk production - Comparing results of FARMIS and RAUMIS (milk price -22 %)



Source: RAUMIS and FARMIS, own calculations based on the national FADN.

Osterburg/Offermann/
Bertelsmeier_2001-12-20

These figures are smaller than indicated by the results of FARMIS. The expansion of production in the southern Laender is calculated to be 6 %, which is somewhat higher than in FARMIS. For these regions, the relative competitiveness of milk production in these regions is quite similar in both models. An exception is the central region, where the milk production increases by almost 14 % according to the results of RAUMIS. This can be attributed to the fact that in the mountainous regions of Hesse, Rhineland–Palatinate and Saarland large areas of grassland are available, leading to a low milk production of less than 4000 kg per hectare of grassland in the base situation. In FARMIS the larger, competitive farms in this region possess comparably few grassland area in relation to their milk production. Since RAUMIS is based on the concept of a 'regional farm', the total regional grassland area is available for milk production without any additional transaction costs. In contrast, in FARMIS, the limitation of the grassland area in large dairy farms acts as a restriction. However, since less than 7 % of the sectoral milk quantity is produced in the central region, this difference between the two models only marginally affects the sectoral results.

Table 4.3: Consequences of an abolishment of the milk quota regime - Results of the regional model RAUMIS

		Germany						
Scenario		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Crop and animal production			*relative change to the refence (%)*					
Grandes Cultures	1,000 ha	9039	*-0.2*	*-0.1*	*0.1*	*-1.7*	*-1.6*	*-1.6*
Maize for silage	1,000 ha	976	*5.3*	*3.6*	*1.1*	*-4.9*	*-6.7*	*-9.9*
Other forage production	1,000 ha	544	*7.2*	*4.6*	*1.1*	*34.5*	*33.1*	*30.8*
Grassland area (total)	1,000 ha	4622	*1.8*	*1.5*	*1.0*	*3.9*	*3.8*	*3.8*
... Intensive grassland	1,000 ha	2911	*5.3*	*4.2*	*2.3*	*-16.5*	*-20.1*	*-27.1*
... Extensive grassland with AEP [1)]	1,000 ha	1439	*-0.3*	*-0.2*	*0.0*	*7.1*	*7.7*	*8.9*
... Extensive grassland without AEP	1,000 ha	273	*-23.8*	*-17.9*	*-7.8*	*205.8*	*238.6*	*306.2*
Fallow [2)]	1,000 ha	284	*-32.9*	*-27.7*	*-17.8*	*-65.2*	*-63.4*	*-61.5*
Milk cows	1,000 heads	3990	*9.2*	*6.2*	*2.6*	*11.1*	*7.6*	*1.6*
Suckler cows	1,000 heads	869	*-7.1*	*-3.4*	*0.1*	*-51.5*	*-47.1*	*-39.4*
Bulls for fattening	1,000 places [3)]	2216	*3.3*	*2.5*	*1.1*	*-5.0*	*-5.7*	*-7.8*
Output								
Beef production	1,000 t	1254	*4.4*	*3.3*	*1.5*	*-2.6*	*-4.0*	*-6.6*
Milk production	1,000 t	27163	*9.3*	*6.3*	*2.7*	*11.5*	*7.9*	*1.9*
Income								
Net value added (in terms of factor cost)	Mio. €	11566	*-4.9*	*-7.6*	*-11.6*	*-3.1*	*-5.9*	*-10.2*
Net value added per work unit [4)]	1,000 €	19933	*-7.0*	*-9.0*	*-12.1*	*-3.9*	*-5.9*	*-8.8*
Direct Payments								
Total premia	Mio. €				in Mio. €			
... Grassland premia	Mio. €	6,414	6,661.6	6,658.3	6,648.1	6,671.6	6,663.3	6,649.9
... Beef Premia (total)	Mio. €	3,493	3,479.8	3,485.0	3,492.5	3,458.3	3,460.2	3,462.8
... Milk Premia	Mio. €	203	202.6	202.9	203.3	2,171.7	2,168.9	2,165.5
Beef Premia (total)	Mio. €	1,726	1,960.7	1,959.8	1,953.3	57.7	57.8	57.9
Milk Premia	Mio. €	697	928.4	928.4	928.4	0.0	0.0	0.0

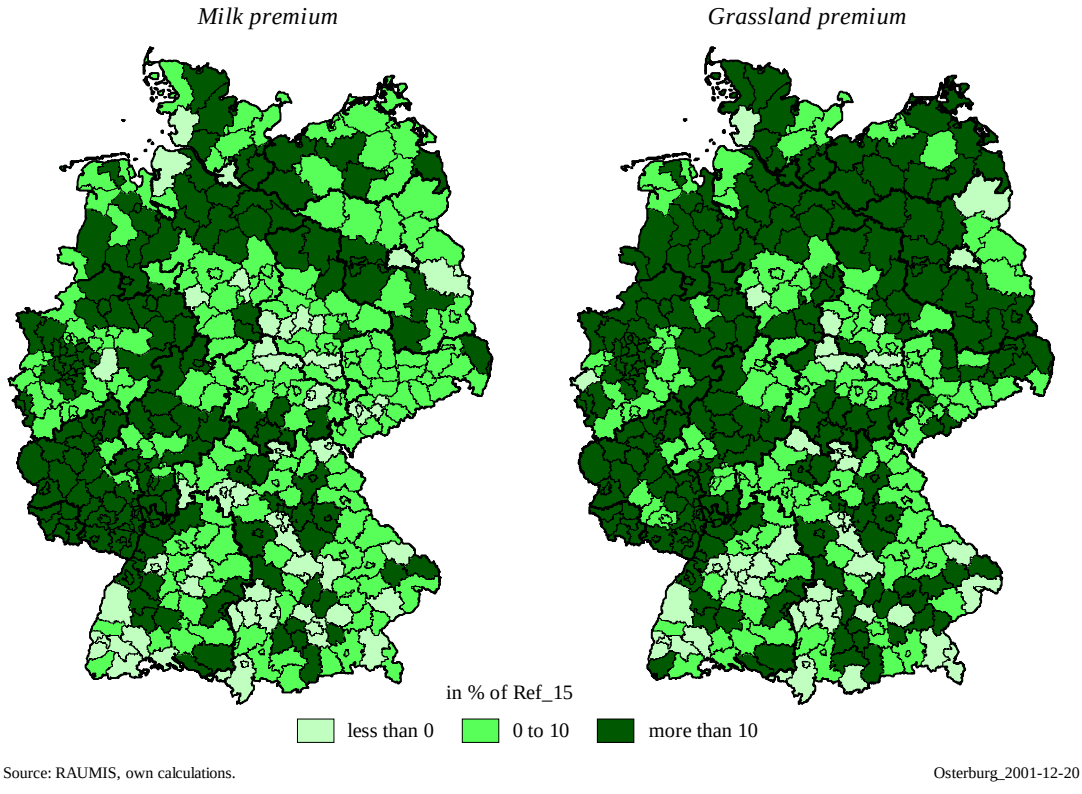
1) With direct payments related to agri environmental programmes (AEP).
2) Mainly fallow of grassland.
3) Occupied housing capacity.
4) Demand for labour is modelendogenously calculated.
Source: Calculations based on RAUMIS.

Osterburg, FAL-BAL (2001)

In addition to the dairy yield per cow and the structure and size of the dairy farms, the change of milk production in the model RAUMIS is influenced by the following factors: available grassland area, intensity of forage production in the reference situation, the respective possibilities for intensification and the possibility of an expansion of the forage production (grass, forrage maize). In this context it is to be pointed out that the projection of the area of grassland in RAUMIS was derived from the developments in the 90s and has been applied to the time span up to the year 2008. As a result the grassland area in the north-west of Germany and in Bavaria is reduced, while it is expanding in Hesse and Rhineland–Palatinate. As a consequence, the grassland use in the northern region is already comparatively intensive in the reference. In the central region, the intensity of forage production is low in the reference, while it is clearly increased in the scenario Mp_22. In the southern and eastern regions grassland-based agri-environmental programmes, which financially support the extensive use of grasslands, are of great importance. The agri-environmental payments tend to curb an intensification of grassland use, and in turn the expansion of milk production.

Map 4.1 shows the regional development of milk production (Mp_22) according to the results of RAUMIS.

Map 4.1: Regional development of milk production (milk price -22 %)



The milk production will expand especially in the northern coastal plains and in the mountainous regions of West Germany. In the pure grassland locations in the marshes and in the Alps the production tends to increase to a lower extent, since in these regions there are fewer chances for an expansion of the arable fodder production.

The regional income changes depend on the importance of the milk production and on the adaptation to the changes of frame conditions. Since the decline in milk prices is at least partly compensated through the milk premia, it does not result in any additional re-distribution between the regions. Comparatively large declines in income of 10 % of the net value added (at factor cost, equivalent to the regional farm income) occur in regions where a high share of income is related to milk production (see Chapter 4.2), as there are the marshy areas of the north-west, the mountainous regions of west Germany and also the fodder growing areas of Bavaria and north-east Germany.

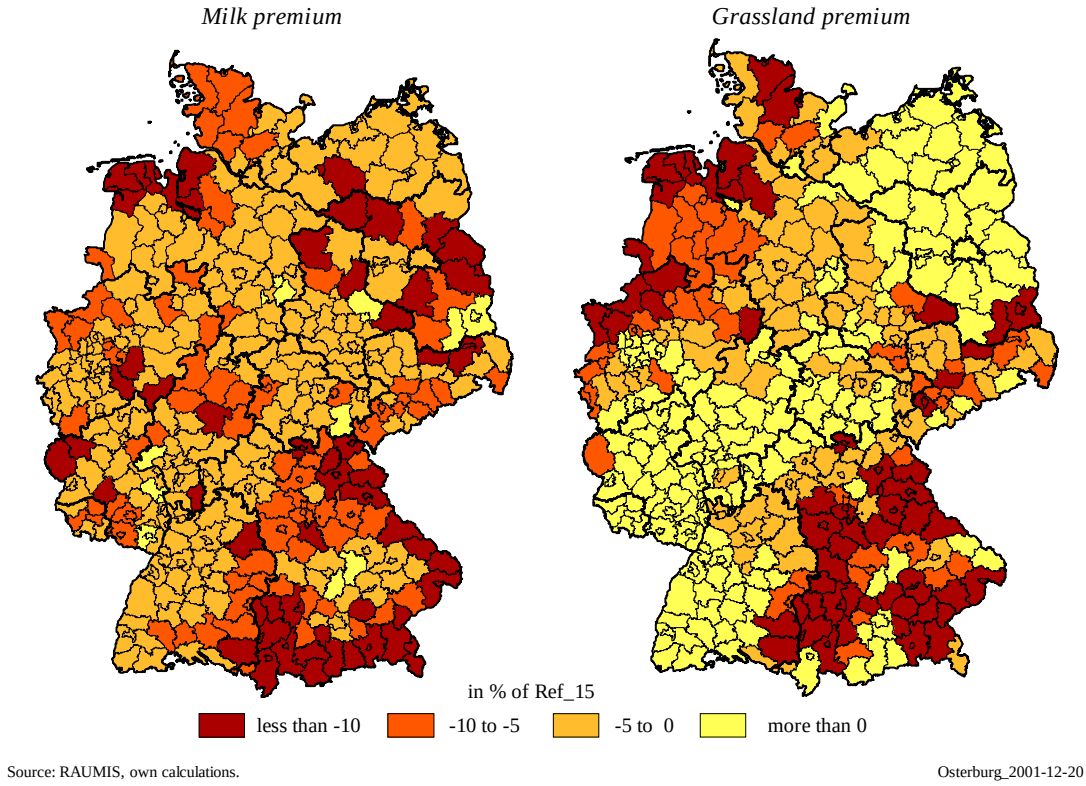
4.3.2 Grassland premia

For the regions ‘north’, ‘central’ and ‘east’, the results of FARMIS indicate that the payment of grassland premia leads to a significantly larger expansion of milk production than in comparable scenarios with milk premia. In the regions north and east, milk production increases by 18 % (see Table 4.3). In contrast, the southern region lags behind with a growth of 4.6 % in scenario Gp_22.

The computations with RAUMIS also show a higher increase of milk supply in the regions north and east with the introduction of a grassland premia, while the supply in the central and southern regions is comparable to the developments in the milk premia scenario. The development of milk supply in the southern region lags behind the other regions. As shown in Map 4.1, the regional distribution of the expansion of the production does not differ much between the scenarios Mp_22 and Gp_22.

The development of income as a consequence of the introduction of grassland premia is very different from the results of the milk premia scenario (see Map 4.2). Especially regions with a high milk production and high beef premia per hectare of grassland in the reference situation are affected by a large decline in income. These are regions in the north-west of Germany and Bavaria as well as regions in the south-east (Baden–Wuerttemberg). In eastern Germany, mainly regions with a low share of permanent grasslands are affected. In these regions, the introduction of a national uniform grassland premia leads to lower transfer payments compared to the milk premia scenario. In contrast, in areas with extensive grassland use in the reference, income effects are more favourable. This is the case in mountainous regions of west Germany and north-eastern Germany, where direct payments increase for the scenario with a grassland premia.

Map 4.2: Regional development of income (milk price -22 %)



A uniform premia for grassland would lead to a pronounced redistribution of direct payments at the expense of regions with intensive milk production and in favour of regions with a high share of extensive grassland.

4.4 Supply and income effects of milk and grassland premia: results for grazing livestock farms, differentiated by herd size

The consequences of milk and grassland premia on grazing livestock farms, differentiated by herd size, are analysed based on the results from FARMIS. Farms are classified by the number of dairy cows kept in the base year (Table 4.4). Each of the resulting groups represents a minimum of 20 % of the sectoral milk production in the base year.

The group of grazing livestock farms accounts for approx. 88 % of the sectoral milk production and 77 % of the beef production. The average milk yield of approx. 6900 kg per cow lies clearly above the average milk yield of other farm types, which can be attributed to the high degree of specialisation.

Table 4.4: Change of milk and beef production as well as of income and direct payments by size classes (part 1)

		Grazing livestock farms						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.22	0.24	0.23	0.22
Average milk yield	kg/year	6879	6913	6912	6902	6913	6911	6911
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	25119	*10.0*	*6.5*	*3.4*	*12.5*	*9.4*	*3.5*
Beef production	t	1120896	*3.3*	*1.9*	*1.3*	*-10.7*	*-10.9*	*-11.7*
Milk cows	Units	3651360	*9.5*	*6.0*	*3.0*	*11.9*	*8.9*	*3.0*
Bulls for fattening	Units	1615763	*0.6*	*-0.3*	*-0.1*	*-31.3*	*-29.6*	*-28.2*
Acreage permanent grassland (incl. fodder crops)	1000 ha	3914	*3.0*	*2.5*	*1.1*	*13.5*	*12.9*	*11.9*
Acreage Grandes Cultures	1000 ha	2969	*0.8*	*2.0*	*2.9*	*-11.6*	*-10.5*	*-9.3*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	3396	*-8.6*	*-16.0*	*-27.7*	*-12.1*	*-19.7*	*-32.6*
Net value added per unit manpower	€	17210	*-12.7*	*-18.9*	*-29.6*	*-15.1*	*-21.4*	*-32.6*
Direct Payments								
Beef premia (total)	Mio. €	1308	1527	1520	1516	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	744	963	959	954	-	-	-
Premia Grandes Cultures	Mio. €	1038	1044	1057	1067	915	927	939
Grassland premia	Mio. €	-	-	-	-	1565	1555	1536
Premia (total)	Mio. €	2354	2576	2581	2589	2485	2488	2487
		Size class <20						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.21	0.24	0.23	0.21
Average milk yield	kg/year	6129	6155	6130	6140	6140	6143	6150
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	3525	*6.0*	*0.2*	*-1.0*	*6.2*	*2.9*	*-2.0*
Beef production	t	264042	*3.6*	*-0.2*	*-0.3*	*-15.3*	*-15.6*	*-16.3*
Milk cows	Units	575130	*5.6*	*0.2*	*-1.1*	*6.0*	*2.7*	*-2.3*
Bulls for fattening	Units	449235	*4.2*	*0.1*	*0.4*	*-28.3*	*-28.0*	*-28.0*
Acreage permanent grassland (incl. fodder crops)	1000 ha	893	*1.5*	*2.2*	*2.0*	*11.2*	*10.5*	*9.2*
Acreage Grandes Cultures	1000 ha	515	*-2.2*	*-0.4*	*-0.1*	*-10.7*	*-9.5*	*-7.3*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	266	*-24.9*	*-39.2*	*-57.0*	*-23.6*	*-35.0*	*-52.6*
Net value added per unit manpower	€	5421	*-26.3*	*-39.2*	*-56.8*	*-23.4*	*-34.2*	*-51.2*
Direct Payments								
Beef premia (total)	Mio. €	298	332	326	326	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	108	138	137	136	-	-	-
Premia Grandes Cultures	Mio. €	178	174	177	178	159	161	165
Grassland premia	Mio. €	-	-	-	-	350	350	347
Premia (total)	Mio. €	481	509	507	506	510	510	510

Table 4.4: Change of milk and beef production as well as of income and direct payments by size classes (part 2)

		Size class 20 - 35						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.22	0.24	0.23	0.22
Average milk yield	kg/year	6452	6453	6452	6452	6449	6448	6446
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	7691	*3.7*	*0.8*	*0.0*	*6.0*	*2.6*	*-3.0*
Beef production	t	294588	*0.9*	*0.2*	*-0.2*	*-9.9*	*-10.8*	*-12.2*
Milk cows	Units	1192135	*3.7*	*0.7*	*0.0*	*6.0*	*2.6*	*-2.9*
Bulls for fattening	Units	395614	*0.0*	*0.2*	*-0.2*	*-28.1*	*-27.8*	*-27.3*
Acreage permanent grassland (incl. fodder crops)	1000 ha	968	*1.7*	*0.4*	*-3.4*	*16.2*	*15.4*	*13.8*
Acreage Grandes Cultures	1000 ha	793	*-2.1*	*-0.5*	*1.7*	*-19.6*	*-18.6*	*-16.6*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	1083	*-13.8*	*-20.1*	*-30.0*	*-23.6*	*-30.7*	*-41.5*
Net value added per unit manpower	€	20260	*-14.9*	*-20.3*	*-30.6*	*-23.8*	*-30.0*	*-39.6*
Direct Payments								
Beef premia (total)	Mio. €	347	411	411	410	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	229	293	292	292	-	-	-
Premia Grandes Cultures	Mio. €	279	273	277	284	224	227	232
Grassland premia	Mio. €	-	-	-	-	449	447	437
Premia (total)	Mio. €	627	685	689	695	621	621	621
		Size class 35 - 100						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30.0
Average milk price (absolute)	€/kg	0.27	0.24	0.23	0.21	0.24	0.23	0.22
Average milk yield	kg/year	7426	7437	7438	7432	7442	7432	7433
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	11003	*15.0*	*12.1*	*7.4*	*16.7*	*14.3*	*8.3*
Beef production	t	446555	*4.5*	*4.1*	*3.4*	*-11.0*	*-10.3*	*-10.5*
Milk cows	Units	1481680	*14.8*	*12.0*	*7.4*	*16.5*	*14.2*	*8.2*
Bulls for fattening	Units	673995	*-1.1*	*-0.8*	*-0.2*	*-34.0*	*-30.3*	*-27.3*
Acreage permanent grassland (incl. fodder crops)	1000 ha	1448	*5.1*	*4.5*	*3.8*	*10.9*	*10.7*	*10.9*
Acreage Grandes Cultures	1000 ha	802	*8.5*	*9.5*	*10.7*	*-2.7*	*-1.4*	*-1.9*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	1722	*-1.7*	*-8.7*	*-20.2*	*-5.9*	*-12.9*	*-26.1*
Net value added per unit manpower	€	25537	*-10.8*	*-16.4*	*-25.6*	*-12.9*	*-18.1*	*-28.7*
Direct Payments								
Beef premia (total)	Mio. €	524	619	619	618	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	320	418	417	415	-	-	-
Premia Grandes Cultures	Mio. €	285	306	309	313	274	278	276
Grassland premia	Mio. €	-	-	-	-	731	728	721
Premia (total)	Mio. €	811	926	929	932	842	844	844

Table 4.4: Change of milk and beef production as well as of income direct payments by size classes (part 3)

		Size class > 100						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Relative milk price change	%	-11.8	-22.0	-25.0	-30.0	-22.0	-25.0	-30
Average milk price (absolute)	€/kg	0.26	0.24	0.23	0.21	0.24	0.23	0.21
Average milk yield	kg/year	7205	7209	7209	7209	7206	7206	7206
Milk premia	Cent/kg	2.50	3.33	3.33	3.33	-	-	-
Grassland premia	€/ha	-	-	-	-	353	353	353
Production/*relative change %*								
Milk production	1000 t	2899	*12.9*	*8.3*	*2.2*	*21.2*	*16.7*	*9.1*
Beef production	t	115712	*3.8*	*2.3*	*0.1*	*-0.8*	*-2.4*	*-4.9*
Milk cows	Units	402415	*12.9*	*8.3*	*2.1*	*21.2*	*16.7*	*9.1*
Bulls for fattening	Units	96918	*-2.0*	*-1.6*	*-1.2*	*-40.1*	*-40.0*	*-39.4*
Acreage permanent grassland (incl. fodder crops)	1000 ha	605	*2.5*	*1.4*	*0.4*	*18.9*	*17.6*	*15.4*
Acreage Grandes Cultures	1000 ha	860	*-2.0*	*-1.4*	*-1.4*	*-13.1*	*-12.2*	*-10.7*
Income/*relative change %*								
Net value added (in terms of factor costs)	Mio. €	325	*-13.9*	*-22.2*	*-35.8*	*2.2*	*-6.8*	*-20.6*
Net value added per unit manpower	€	11842	*-16.8*	*-23.9*	*-36.2*	*-3.2*	*-10.7*	*-22.4*
Direct Payments								
Beef premia (total)	Mio. €	140	164	164	163	-	-	-
Milk cows premia (milk and slaughter premium)	Mio. €	87	113	112	111	-	-	-
Premia Grandes Cultures	Mio. €	296	291	293	293	258	261	266
Grassland premia	Mio. €	-	-	-	-	70	69	68
Premia (total)	Mio. €	436	455	457	456	512	512	512

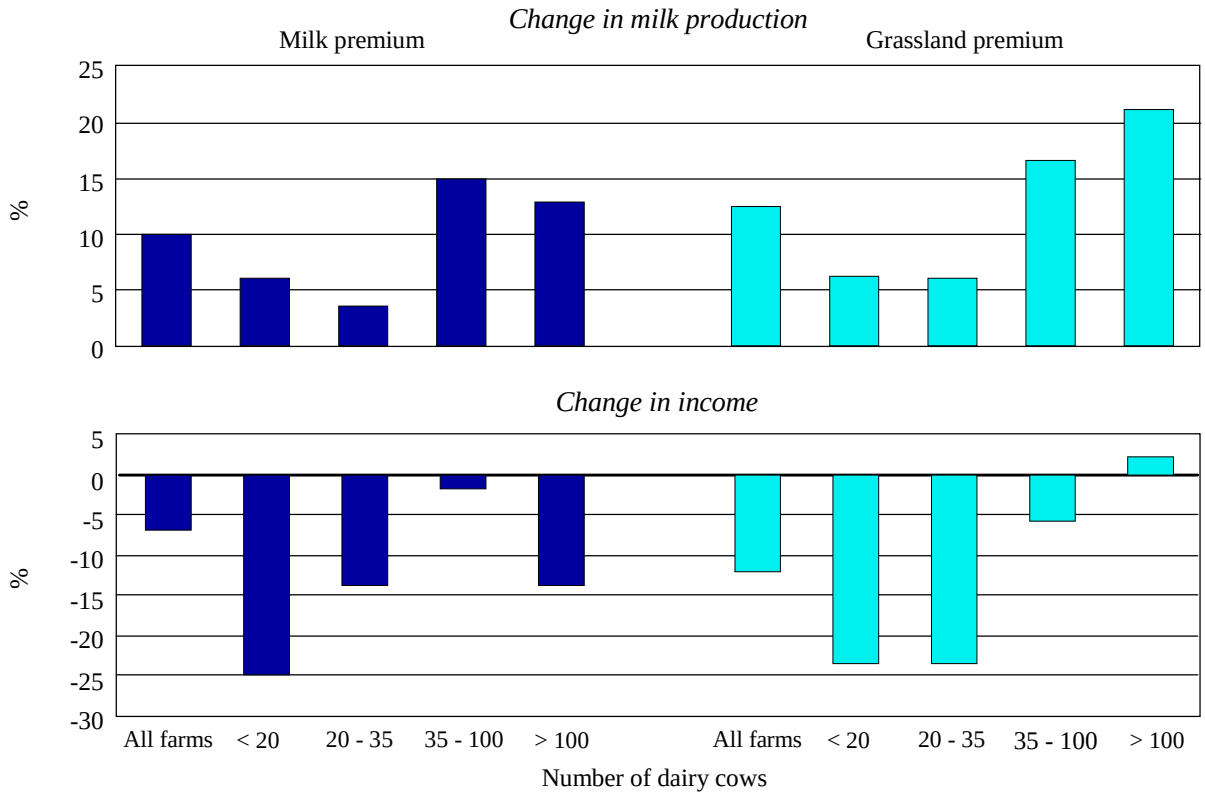
Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

The supply reactions of grazing livestock farms for milk and beef differ only marginally from the sectoral ones in all the examined scenarios (Table 4.4 and Figure 4.7). The relative income effects turn out to be much higher, which is due to both the low income level of this group in comparison to all farms and the fact that revenues from milk sales account for a large share of total income. Net value added declines by 8.6 % in scenario Mp_22, which compares to a decrease of 3.5 % considering the whole sector. The decline in income is amplified to 16 % and 27.7 % respectively with reductions in producers' price for milk of 25 % and 30 % respectively.

Classifying grazing livestock farms by size illustrates that for the milk premia scenarios, farms with 35 to 100 dairy cows realise the largest increase in supply with comparatively low income effects (see Figure 4.7). The increase in supply in this group amounts to 15 % (Mp_22), 12.1 % (Mp_25) and 7.4 % (Mp_30) respectively. In comparison to the reference, income changes only marginally (–1.7 %) in the scenario Mp_22 (–8.7 % in scenario Mp_25; 20.2 % in Mp_30). This size class is prevalent especially in the regions of northern Germany, where competitiveness of milk production is high.

The supply increase of farms with less than 20 dairy cows as well as of those with 20 to 35 cows is small, while the relative income effects stand out: relative income losses are highest for grazing livestock farms with small cow herds. The analysis of 'Typical Farms' confirms the importance of the starting position a farm has with respect to the degree that it is affected by the analysed policy changes (see Chapter 6).

Figure 4.7: Impact of milk and grassland premia on grazing livestock farms, differentiated by number of dairy cows (milk price -22 %)



Source: FARMIS, own calculations based on the national FADN. Offermann/Bertelsmeier_2001-12-20

In the size class of 100 cows and more, the net value added per worker is rather low in the reference and comparable to the net value added per worker in the eastern region. This is due to the fact that farms with more than a hundred dairy cows are mainly found in the new Laender.

Looking at the results for the scenarios with grassland premia, it can be seen that the largest increase of milk production is to be expected in the group with herd sizes of more than 100 dairy cows (21.2 % for Gp_22, 16.7 % for Gp_25 and 9.1 % for Gp_30). This can be ascribed to the high proportion of grassland used by the grazing livestock farms in the new Laender belonging to this size group. For these farms, the competitiveness of milk production is thus more strongly promoted by the payment of grassland premia than by

the granting of milk premia. Due to the favourable competitive position of this farm group a slight increase in income is realised for a milk price reduction of 22 % (Figure 4.7). For higher price changes negative income effects are to be expected (-6.8 % with Gp_25 and -20.6 % with Gp_30). Beef production of these farms decreases only moderately, as the strongly reduced bull fattening is partly compensated for by the increase in cow meat.

5 Sensitivity analysis for differing arrangements of direct payments and of factors determining supply

With the representative farm model BEMO – among other things – scenario conditions were analysed, which cannot be illustrated with the models working at a higher aggregation level:

– The evaluation of quota trade within the quota regime, the comparison of adaptation strategies between quota trade and the exit from quotas and also the assessment of the distribution effects between lessors and lease holders of quota

– Short and medium term adaptation of farms and also the problem of mixed price calculations in combination with the milk premia

– Variation of beef price in relation with grassland premia

As for FARMIS and RAUMIS the quota costs are not considered in the model BEMO due to the insufficient data base. It is attempted to determine the equilibrium prices with quota trade in order to estimate the value of the milk quota. These results are used in the supplementary calculations for the scenarios of quota exit aiming at the analysis of the influence of saved quota costs.

5.1 Quota trade within the reference and in the transition phase

The milk market reform of Agenda 2000 with milk price reductions, rising of milk quotas and milk premia linked to quotas leads to an economic pressure, which results in organisational adjustments of farms and changes in income. Without the milk market reform the milk price for the year 2008 would be € 0.31 per kg[1], the dual value of milk quota € 0.082/kg and costs of the milk production € 0.22/kg on average. Production costs and dual values vary between farms of different stock sizes, which is to be traced back to varying milk productivity, the extent and cost of hired workers and also the rental value of land (see Table 5.1). In the latest stage of the Agenda 2000 the milk price declines to € 0.27/kg and the marginal costs by approx. € 0.01 to € 0.21/kg.

Since – in the underlying model – farms can expand their milk production only according to the individual quota increase to be decided for Agenda 2000 (1.5 %), milk production in the final stage of Agenda (Ref_15) only increases by 0.9 % on average (see Table 5.2). The quota increase at the sector level will therefore clearly not be exceeded. In the latest

[1] Without VAT.

stage of the transition period, milk production would decrease by 0.2 % without considering quota trade.

Table 5.1: Milk yield, milk price, dual value and marginal costs of milk in the base situation (2007/08)

	Farms		Without milk market reform				Final stage of Agenda 2000 (Ref_15)		
Cow size class	obs.	represented 1,000	Milk yield kg	Milk price €/kg	Dual value €/kg	Marginal costs €/kg	Milk yield kg	Dual value €/kg	Marginal costs €/kg
All farms	4,808	127.9	7,353	0.30	0.08	0.22	0.27	0.06	0.21
<25	1,678	62.3	6,616	0.31	0.08	0.22	0.27	0.05	0.22
25 - 50	1,873	47.1	7,239	0.31	0.10	0.21	0.27	0.07	0.20
50 - 100	888	15.2	7,761	0.30	0.09	0.22	0.27	0.06	0.21
>100	369	3.3	7,828	0.30	0.06	0.25	0.27	0.05	0.22

Remark: Weighted averages using weighting factors. Kleinhanss_2001-12-20
Source: BEMO, own calculations based on the national FADN.

Table 5.2: Change of milk production and income with/without milk market reform resp. with/without quota trade

	Milk production					Income				
	Without milk market reform	With milk market reform				Without milk market reform	With milk market reform			
		Without milk quota trade		With milk quota trade			Without milk quota trade		With milk quota trade	
Cow size class	qn	Ref_15 %	AG_20 %	Ref_15 [1] %	AG_20 [1] %	1,000 €	Ref_15 %	AG_20 %	Ref_15 %	AG_20 %
All farms	2,032	0.9	-0.2	1.5	2.0	56	-3.2	-8.6	-0.7	-6.2
<25	775	0.6	-1.3	-5.4	-4.7	29	-2.2	-6.4	-1.9	-5.9
25 - 50	1,937	1.3	1.3	8.2	8.9	48	-3.3	-9.3	0.0	-5.9
50 - 100	3,938	1.1	0.5	6.8	7.4	81	-4.4	-11.7	-0.8	-8.2
>100	18,237	0.3	-2.1	-8.3	-8.2	555	-3.2	-8.0	-0.4	-5.6

Remark: Weighted averages using weighting factors. Kleinhanss_2001-12-20
1) Equilibrium price for quota 50.11 €/t.
2) Equilibrium price for quota 34.77 €/t.
Source: BEMO, own calculations based on the national FADN.

Additionelly allocated milk quotas within Agenda or the transition period can be only exhausted through milk quota trade. Within the scope of the study, milk quota trade is

depicted in a simplified way.[2] It is assumed that

– Milk quotas can be traded all over the country
– Trade is only allowed for lease of quota (thus it can be abstracted from the depreciation time period up to an exit from milk quotas)
– All farms leasing quotas can expand their milk production on a variable cost basis[3] within the limits of the scope of adjustment (mentioned in Chapter 2.4). Beyond that, investment in stable capacities is required.

For the final stage of Agenda 2000 (Ref_15), the equilibrium price for quota lease amounts to € 50/ton milk quota, assuming that milk production on the total of all farms will expand by 1.5 % (equal to the additional quota in Agenda; see Table 5.2). Approximately 10 % of the total milk quota will be traded and a shift of milk production to the advantage of farms with 25 to 100 dairy cows respectively of western Germany is to be expected. This result indicates that under conditions of Agenda 2000, the profit margin for milk production drops to less than € 0.05/kg, first of all in small dairy farms or those farms with a high share of hired workers and rented land. For these farms the lease of milk quotas is more economical than producing milk. Approximately 10 % of the farms in the sample (non-weighted with weighing factors) go out of milk production (see Figure 5.1), a further 15 % of the farms reduce production, and a small number of farms will achieve growth in conjunction with investment in stables.

In the latest stage of the transition phase an equilibrium price of € 35/ton of lease quotas appears, which is one-third less than in Ref_15. This results from the strong fall in milk prices and the resulting under-compensation of output deficits by direct payments. Milk quotas are mainly passed-on to farms with 25 to 100 dairy cows.

Expected income deficits due to the milk market reforms can be clearly reduced through trade of the milk quota (see Table 5.2). For the total of dairy farms an income growth (in Ref_15) of € 192 million is to be expected; in the latest stage of the transition period it still amounts to € 176 million (see Table 5.3). Approximately two-third of the income growth remains to lease holders and one-third to the lessors of milk quotas. The relation-

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[2] The model was enlarged for the formulation of questions of milk quota trade by the inclusion of lease activities of milk quotas. By means of mixed-integer-formulation it is ensued that every farm can either take on a lease or lease out milk quota for a definite lease price level. The lease price is exogenously fixed. By the variation of lease prices the supply function and demand function for milk quotas can be derived and the equilibrium price be iteratively determined. As an equilibrium price solution those are used for which the sectoral milk quota is fully used.

[3] The income measure is based on the gross margin, including costs for renting land and hired workers, investment costs for new milk cattle sheds are taken into account. Further, opportunity costs for unpaid family workers are included as decision variable; the opportunity costs externally added.

ship between the West and the East is also interesting: In the West the largest income growth accrues to the lease holders of milk quotas, while in the new Laender the income growth is mainly for the lessors.

Conclusions are that farms in western Germany would have the main economic advantage from milk quota trade. This could however only be realized with the tradability of milk quotas all over the country. With the present milk quota trade confined to regions at the Laender level, the income effects might clearly be lower.

Table 5.3: Income effects of quota trade within the base situation

	Milk quota traded Mio. t		Income Mio. €				Income effect of quota trade Mio. €		
			With quota trade		Without quota trade				
	Renting	Lease-out	Renting [1]	Lease-out [2]	Renting	Lease-out	Renting	Lease-out	Total
Scenario									
Ref_15 QH [3]									
Germany	2.6	3.0	4,221.1	1,624.3	4,099.9	1,553.9	121.2	70.4	191.7
West Germany	2.2	1.8	3,143.4	785.7	3,041.5	749.5	101.9	36.2	138.2
East Germany	0.5	1.3	1,077.8	838.7	1,058.4	804.5	19.3	34.2	53.5
AG_20 QH [4]									
Germany	2.7	2.9	4,046.7	1,402.1	3,926.2	1,346.4	120.6	55.7	176.4
West Germany	2.2	1.7	2,940.3	690.8	2,839.1	661.9	101.3	28.9	130.3
East Germany	0.5	1.2	1,106.4	711.3	1,087.1	684.6	19.3	26.7	46.1

1) Group of farms renting quota. 3) Equilibrium price for quota 50.11 €/t. Kleinhanss_2001-12-20

2) Group of farms leasing-out quota. 4) Equilibrium price for quota 34.77 €/t.

Source: BEMO, own calculations based on the national FADN.

5.2 Adjustment reactions to quota exit versus quota trade

While the quota trade allows a better allocation of milk production, the question rises if coherent adaptation strategies of farms between quota trade and the exit of quota can be expected. A comparison is however only possible under the assumption of tradability of the quotas in the whole country.

With reference to the dual values for milk quota under the quota system (DV) and/or the marginal profits[4] after the quota exit (MP) as well as the quota lease prices (PL) adjustments of milk production under the following conditions are to be expected:

[4] Dual values for milk quota represent the marginal use of the milk quota; they are comparable with the marginal profits of milk production after exit of quota (DV →MP).

Milk production	Reference (quota trade)	Quota exit
Reduction	DV < PL	MP= 0
Increase	DV > PL	MP > 0

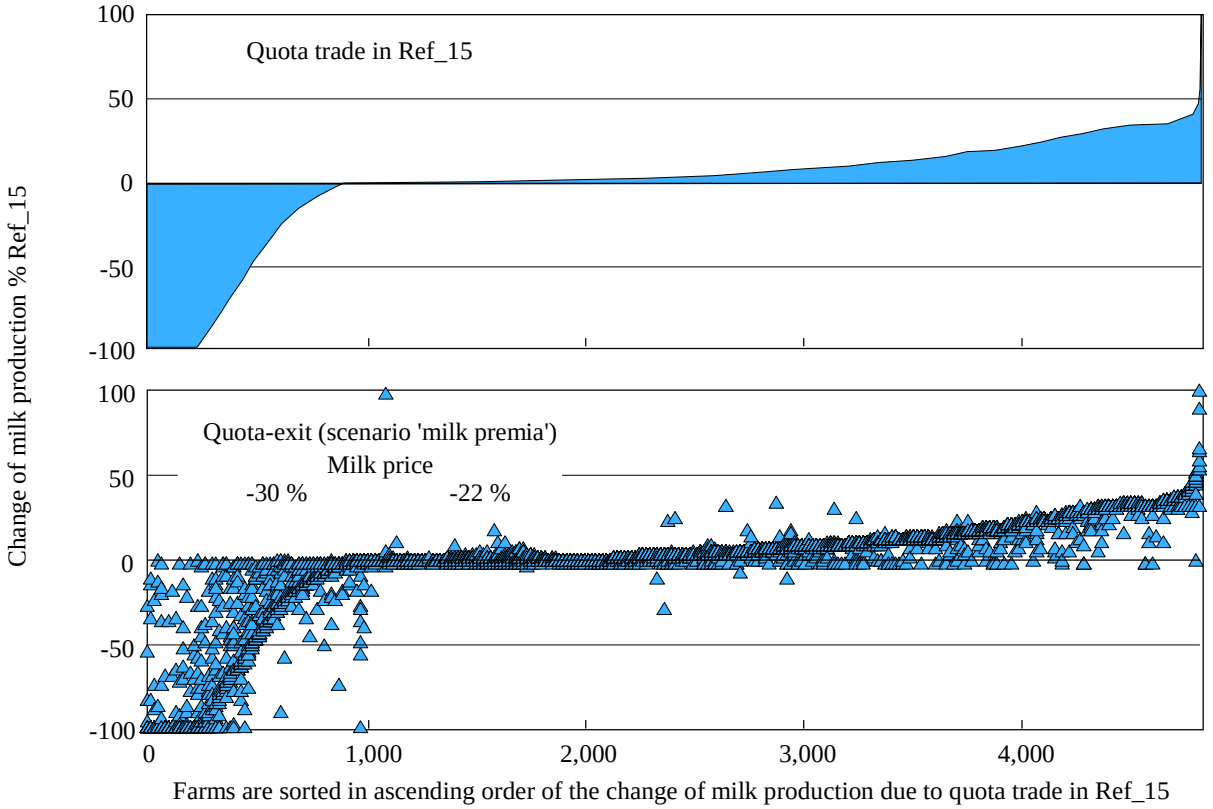
Hence it follows that different adjustment reactions are induced depending on the level of the lease price. If PL= 0, the adjustment reaction between quota trade and quota exit will be the same, all other conditions being the same.

Comparing the farm's individual change rates in milk production between quota trade and quota exit the following tendencies can be seen (scenario milk premium):

– Farms, which under the quota regulation lease out their milk quotas, will reduce production under the exit from quotas and large reductions of the milk price (-30 %).

– Farms, which take-on the lease quota, expand production even with the exit from quotas as long as the milk price falls by only 22 %.

Figure 5.1: Comparing the change of milk production by quota trade (in Ref_15) resp. quota-exit



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

Figure 5.1 shows the change in milk production of farms in the scenarios Ref_15qh (with quota trade) and milk premia, sorted according to the alteration rates in Ref_15qh. The tendency mentioned above is confirmed in comparing the two diagrams, however a larger variance of the farms adjustment reactions occurs with the quota exit. Within the group of farms reducing their production under the quota exit, a larger part reduces production less strongly than with quote trade, because the reduction is not favoured through lease prices for quotas. In the group of farms which do not react in the case of the quota trade, a larger part expands production because they do not have to pay for quotas to expand. Between the enterprises growing with the quota trade again one part expands the production much less, which might have to be attributed to less favourable conditions (stronger milk price reduction, increasing under-compensation of the output deficits). Some of the enterprises attribute the production to the level of the reference, so that for the entire milk quantity milk premiums can be claimed. It is clear, however, that the farms having relatively strong growth through quota trade also react similarly by an exit from quotas.

These result point to a certain parallelism of the adjustment reactions between milk quota trade and milk quota exit. In the case of the quota exit, the production might shift more strongly towards enterprises and locations, which would grow under conditions of the quota trade. The regional differentiation of the quota purchase prices also can be taken as an indicator: high quota prices point to favourable competitiveness at least in the short run. Since regional changes of production determined by the farm model show a certain simultaneity with the regional market prices obtained with the present quota trade, it can be concluded that the short term adjustment reactions of the enterprises might be predicted correctly.

5.3 Sensitivity analysis within the system of milk premia

While the average result of BEMO does not substantially differ from FARMIS (Table 5.4 and Chapter 4), the emphasis of the description lies on the sensitivity analysis. All the results are related to the latest stage of Agenda 2000 (Ref_15 without quota trade); production volumes and income of the reference are shown in Annex 1, Table A1.2).

Through the milk market reform within the scope of Agenda 2000 the producer price falls by 11 %. Including milk premia the producer incentive price reduces however, by only € 1/qn as long as the production lies within the scope of the reference. Since the marginal costs of milk production in a majority of the farms are lower than the reduced milk price (see Table 5.1) the production might mainly expand corresponding to the increase in quotas.

Table 5.4: Change of production and income due to quota-exit against Ref_15 - Scenario 'milk premia'

	Milk production			Beef production			Direct payments [1]			Income		
Cow size class	.._22 [2] %	.._25 [2] %	.._30 [2] %	.._22 %	.._25 %	.._30 %	.._22 %	.._25 %	.._30 %	.._22 %	.._25 %	.._30 %
Base scenario 'milk premia' including ceilings for premia												
All farms	7.6	4.8	-2.2	2.3	1.6	-0.8	9.2	8.7	7.2	-5.0	-9.0	-15.6
<25	3.5	0.1	-7.8	1.3	0.5	-1.5	7.4	6.7	5.2	-4.1	-7.3	-12.7
25 - 50	10.6	8.4	3.2	2.3	1.9	0.7	12.3	11.9	10.6	-5.1	-9.7	-17.4
50 - 100	10.6	8.3	2.6	3.5	3.3	1.7	14.9	14.5	12.7	-6.9	-12.4	-21.4
>100	3.4	-0.4	-10.7	2.4	1.0	-5.0	5.8	5.4	3.9	-4.4	-7.6	-12.5
Variation: without premia restrictions												
All farms	10.4	8.2	2.0	2.9	2.3	0.1	13.4	12.8	10.8	-3.3	-7.4	-14.2
<25	6.7	3.7	-3.9	1.7	0.9	-1.1	10.4	9.6	7.6	-2.9	-6.1	-11.7
25 - 50	13.7	12.0	7.5	2.9	2.5	1.2	18.9	18.3	16.3	-2.9	-7.6	-15.4
50 - 100	12.9	11.2	6.6	4.0	4.1	2.7	22.4	21.7	19.3	-4.6	-10.2	-19.4
>100	6.0	3.1	-6.5	3.7	2.6	-2.8	7.9	7.4	5.6	-3.5	-6.7	-11.9

Remark: Weighted averages using weighting factors. Kleinhanss_2001-12-20

1) Excluding premia for agri-environmental programs and for less favoured areas.

2) Change of milk price %.

Source: BEMO, own calculations based on the national FADN.

Production linkages of a graduated producer's incentive price

The system of the milk premium works like a graduated producer incentive price. Related to the average of all farms the following producer incentive prices (€/qn) applying 2008:

Scenarios	Production within the reference quantity	Expansion of production
Without milk market reform	30.5	
Agenda 2000 (Ref_15)	29.6	27.0
Exit from the quota system		
Mp_22	27.1	23.8
Mp_25	26.2	22.9
Mp_30	24.6	20.9

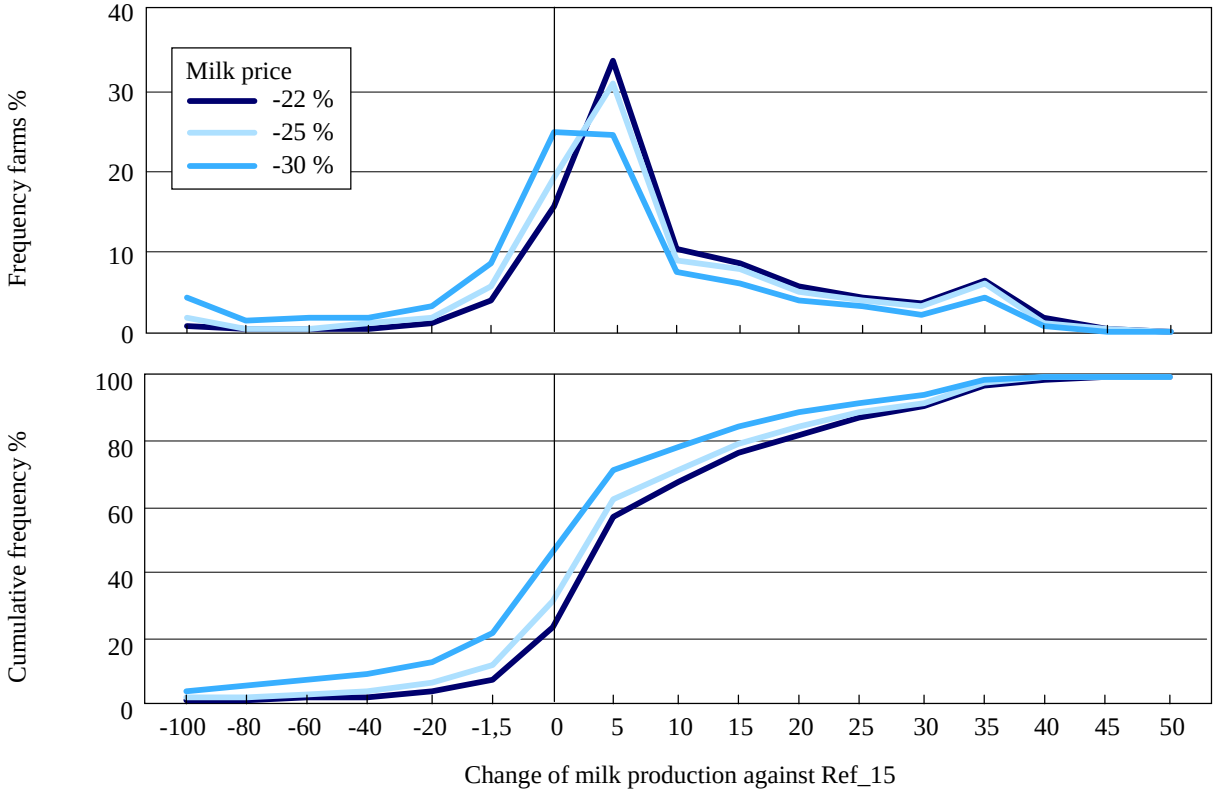
Under the conditions of an exit from the quotas the graduated milk price will have a stronger guidens effect on production:

– Through the strong milk price reduction, the production costs partly exceed the revenue

– The gap between lowered milk price and producer incentive price (including premium) increases; farms with higher production costs will therefore reduce production to the level of the reference, so that they receive the milk price plus premium for the whole quantity

The latter is proved by the results shown in Figure 5.2. Therefore, about 15 % of the farms in Mp_22 respectively 25 % in Mp_30 limit their production according to the base (1999), so that they obtain the higher producer incentive price.

Figure 5.2: Distribution of changes of milk production due to a quota-exit - Scenario 'milk premia'



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

On the basis of these results it seems to be possible to use the premia scheme in order to reduce production of least cost producers. These would be possibly for example if the ceiling for the milk premia were stipulated on x % (x < 100) of the reference volume. Model calculation with a curtailment of premia volume by 10 % shows the following:

– The milk production decreases vis-à-vis scenario Mp_22/30 by 1.5 to 2.5 percentage points
– Connected with it are however further income deficits of approximately 1 percentage point.

The share of farms, which align their production to the lower premium limits – thus 90 % of the reference – lies in the order of magnitude mentioned above. From this 'market relief', free spaces for the expansion of production in economically producing enterprises and thus an improvement of the allocation result. However, the problem of the mixed price formation has not yet been solved.

Mixed price formation as a basis for farmers decisions

The problem of the mixed price calculation remains if farmers' decisions are not made on the basis of graduated producer incentive prices, but on the basis of the average milk price calculated from milk sales and milk premia. In order to pursue this question, the restriction for milk premiums is cancelled in the model and no shortening of the milk premium according to an expansion of production is made. This seems justified, because a general premium cut of 5 to 10 % might cause only relatively small supply effects.

Without the staggered producer incentive price resulting from the premia limits the milk production would expand by 10.4 % with a 22 % lower milk price and thus by 2.5 percentage points more than in Mp_22 (see Table 5.4). With a price reduction of 25 % the production increases by 8.2 %, this is 2 percentage points more than in Mp_25. With a price reduction of 30 % the production increases by 2 % while it would be reduced with premium limits. Farms with more than 100 cows reduce their milk production far less strongly and farms with 25 to 100 cows expand the production more strongly as in the basic scenario. Thus, if mixed price calculations are taken as a basis for operational decisions, the production will increase more strongly than shown by the results in Chapter 4.2.

5.4 Sensitivity analysis in relation to grassland premia

The model results of BEMO for the grassland premia show a smaller supply reaction than the results obtained with FARMIS or RAUMIS (Table 5.5, Chapter 4). First of all one cause of this is the considerable shortage of grassland in one part of farms. Another cause

is the varying possibilities of substitution between dairy cows and rearing of suckler cows.

Table 5.5: Change of production and income due to quota-exit against Ref_15 - Scenario 'grass land premia'

	Milk production			Beef production			Direct payments [1]			Income		
Cow size class	.._22 [2] %	.._25 [2] %	.._30 [2] %	.._22 %	.._25 %	.._30 %	.._22 %	.._25 %	.._30 %	.._22 %	.._25 %	.._30 %
					Base scenario 'grassland premia'							
All farms	7.9	4.8	-3.9	-21.0	-21.7	-23.4	-1.0	-1.2	-2.0	-8.0	-12.0	-18.5
<25	5.8	2.6	-5.9	-19.2	-19.5	-20.7	-2.0	-2.4	-3.4	-6.7	-9.9	-15.5
25 - 50	11.4	9.4	4.8	-17.5	-17.6	-18.0	-0.2	-0.5	-1.5	-8.4	-13.0	-20.6
50 - 100	11.0	8.9	2.9	-21.8	-21.7	-22.3	-3.3	-3.8	-5.7	-11.7	-17.1	-26.2
>100	1.1	-4.6	-22.1	-30.3	-33.5	-39.8	0.0	-0.1	-0.3	-6.4	-9.5	-14.0
					Variation: lower reduction of beef price (-10 %)							
All farms	8.1	5.3	-3.2	-9.5	-9.9	-10.8	-0.5	-0.7	-1.4	-5.6	-9.6	-16.1
<25	6.0	2.9	-5.5	-6.5	-6.6	-6.3	-1.3	-1.6	-2.5	-3.7	-6.8	-12.2
25 - 50	11.4	9.5	4.8	-6.8	-6.9	-6.5	0.6	0.2	-0.5	-5.6	-10.1	-17.7
50 - 100	10.9	9.0	2.8	-11.0	-10.6	-9.6	-2.6	-2.9	-4.6	-9.2	-14.6	-23.6
>100	1.8	-2.9	-19.3	-18.2	-20.6	-27.8	0.0	0.0	-0.2	-5.3	-8.4	-13.1
					Variation: without minimum wages for non-paid workers							
All farms	12.2	10.1	4.4	-11.7	-12.1	-12.5	0.3	0.2	-0.1	-5.4	-9.3	-15.7
<25	12.9	12.0	9.7	-4.2	-3.7	-3.3	0.8	0.8	0.5	-3.9	-6.7	-11.4
25 - 50	14.3	13.4	11.0	-7.9	-7.9	-7.5	1.5	1.4	1.2	-6.6	-11.1	-18.4
50 - 100	12.3	11.0	7.3	-17.9	-17.7	-17.1	-2.1	-2.4	-3.1	-10.8	-16.1	-24.9
>100	8.3	2.7	-12.8	-25.0	-28.2	-32.8	0.1	0.1	-0.2	-2.1	-5.4	-10.4

Remark: Weighted averages using weighting factors. Kleinhanss_2001-12-20

1) Excluding premia for agri-environmental programs and for less favoured areas.

2) Change of milk price %.

Source: BEMO, own calculations based on the national FADN.

Smaller price reduction for beef

As a side effect of the grassland premium a strong curtailment of beef production by 21 to 23 % on average is observed. Without the by-production of meat a stronger curtailment of beef could be expected because the rearing of bulls is decreasing more than average. The intensive and predominantly silo-maize based rearing of bulls loses part of its competitiveness.

Because of the relatively strong decrease in beef production in connection with grassland premiums it is to be presumed that the beef prices decrease less strongly than what is assumed in the base scenario (see Table 5.5). Supposing a price reduction for beef of only

10 %, which corresponds to approximately half of the expected price reduction under Agenda 2000, the beef production decreases far less than in the basic scenario for grassland premia. The extent of bull rearing decreases only by about 25 %, while heifer fattening increases.

The expectation, that milk production would expand less due to increasing competition in roughage fodder use, is not fulfilled. Milk production rises by 0.1 to 0.5 percentage points stronger than in the basic scenario. Higher beef prices with c. p. constant premia lead to an improvement of the competitiveness of the by-production of beef. This also strengthens the competitiveness of milk production.

Short-term versus long-term adjustments of farms

Here the question of opportunity costs for non-salaried workers is discussed. In the results mentioned above, a 'minimum wage rate' for non-paid family labour was assumed, which is 50 % of a standard wage rate. Further, the minimum level for hired workers was fixed on this amount. With this, the competitiveness of beef and milk production decrease, especially on small farms. The short-term supply reaction might be underestimated with this procedure because the available capacity of family labour could be used as long as the marginal return is greater than zero.

Without the minimum wage rate for family workers, more milk would be produced with an exit from the milk quota regime; the production increases by 12.2 % with 22 % lower milk price (see Table 5.5). With a milk price reduction of 25 %, 10 % more milk will be produced and for 30 % lower milk price the production still increases by 4.4 %. Without minimum wage rates, the milk production in small farms would hardly be reduced, while for moderate price reductions it would be expanded within the framework of the adjustment capabilities to be mobilised in the short term. Farms with 25 to 100 cows expand their production relatively robustly.

While the earnings for labour use in cattle rearing are lower than in milk production, beef production profits more strongly from lower wages than milk production. In this respect the beef production will only be reduced by approximately 10 %. In combination with favourable beef prices, no significant difference against the reference situation might be expected.

The results point out that with the exit from the milk quota regime, a stronger supply expansion could occur at least in the short-term. This self-exploitation of the family labour capacity will, however, only be undertaken in expectation of long-term income prospects.

Transmission of grassland premium on rental prices for land

Although the problem of the transmission of grassland premiums on land prices is regarded as one of the largest obstacles for the conversion of headage premia into a grassland premium, sufficiently well founded empirical analyses are not available at this time (Chatzis, 1997). With the grassland premia being introduced within the scope of agri-environmental programs, an increasing rental price for land can already be seen. A detailed treatment of this question is not undertaken here, because this topic is being studied in an ongoing project of the Institute of Farm Economics and Rural Studies of FAL.

Model calculations with BEMO under the assumption of a 50 % transmisson of grassland premia on the rental price for land point out the following:

– Increasing land price are first of all to be expected in regions with low rental prices (less favourable natural conditions, low cattle livestock density)
– At these locations significant income losses are to be expected; after the model results this applies in particular in the new Laender
– The supply effects are relatively small in comparison to the income effects

Due to theoretical considerations and based on the experiences gained within the scope of our model calculations, the problem of pass-on effects of grassland premia could be solved only if this premia system lies on the principles of the milk premia system:

– Only grassland in a reference periode of individual farms is authorised for premia
– Premia rights must not be tradable and are transferable neither by leasing by or buying of grassland

In order to prevent a structural conserving effect, the premia should be specified as temporally digressive. Further model-based analysis is necessary to work out detailed proposals for the arrangement of the grassland premia.

5.5 Income effects including savings of quota costs

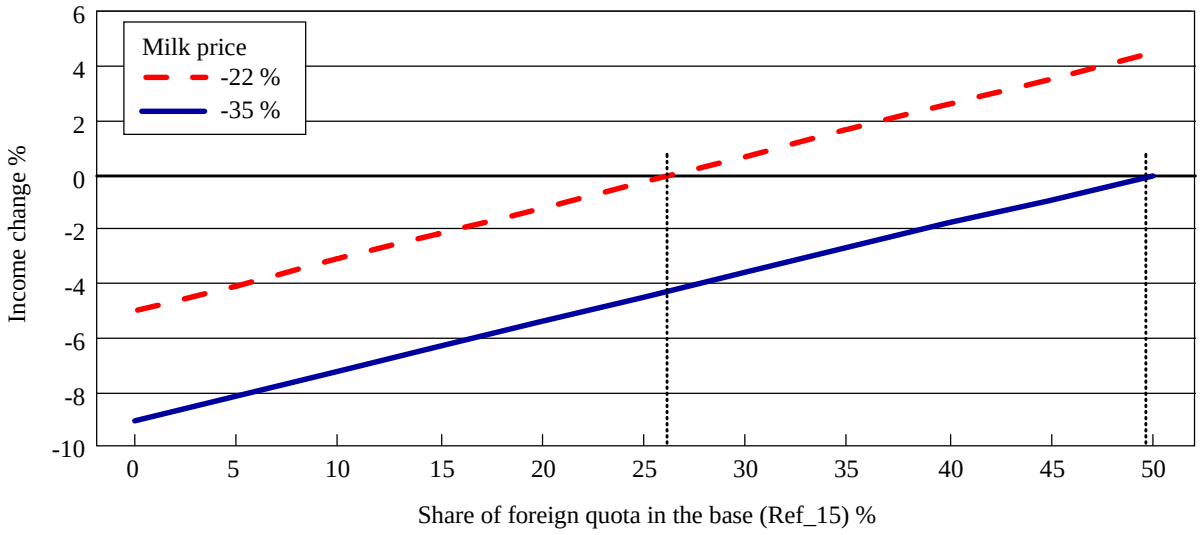
For the results presented above, the costs of milk quota under the quota regime were not taken into account due the insufficient data source. With the help of a simplified calculation it shall be attempted to incorporate quota costs for the reference in the following. They are derived from:

– The equilibrium prices, which are determined with the model version of BEMO tailored to quota trade
– Shares of ‘foreign’ quotas between 10 and 50 % whereby no differentiation was undertaken as per cow-stock size and region. The latter would be obvious, since, for ex-

ample, small farms have bought only small quantities of quota and milk quotas in the new Laender is only tradable since 2000.

The income effects are related to the scenario Ref_15 with/without quota trade. This differentiation has been made because the income in the reference without quota trade are slightly underestimated whereas the increase in income through quota trade is overestimated due to the assumed countrywide tradability. The calculations are carried out for the scenario ‘milk premia’ only considering milk price reductions of 22 and 25 % (see Figure 5.3 and Table 5.6).

Figure 5.3: Income changes depending on the share of foreign quota (scenario 'milk premia')



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

Table 5.6: Income effects of quota-exit including quota cost in Ref_15 (scenario 'milk premia' milk price -22 %)

	Without quota trade in Ref_15 [1]							With quota trade in Ref_15 [1]						
		Share of foreign quota %							Share of foreign quota %					
Cow size class	Ref_15 1,000 €	0 %	10 %	20 %	30 %	40 %	50 %	Ref_15qh 1,000 €	0 %	10 %	20 %	30 %	40 %	50 %
All farms	54	-5.0	-3.1	-1.2	0.7	2.6	4.5	56	-7.3	-5.5	-3.6	-1.7	0.1	2.0
<25	29	-4.1	-2.7	-1.4	0.0	1.4	2.8	29	-4.4	-3.1	-1.8	-0.5	0.8	2.1
25 - 50	47	-5.1	-3.0	-0.9	1.2	3.3	5.4	48	-8.3	-6.1	-3.9	-1.7	0.4	2.6
50 - 100	77	-6.9	-4.3	-1.7	0.9	3.4	6.0	80	-10.2	-7.6	-5.0	-2.3	0.3	2.9
>100	537	-4.4	-2.7	-1.0	0.7	2.5	4.2	553	-7.1	-5.6	-4.0	-2.5	-1.0	0.5

1) Including savings of quota costs against Ref_15. Kleinhanss_2001-12-20

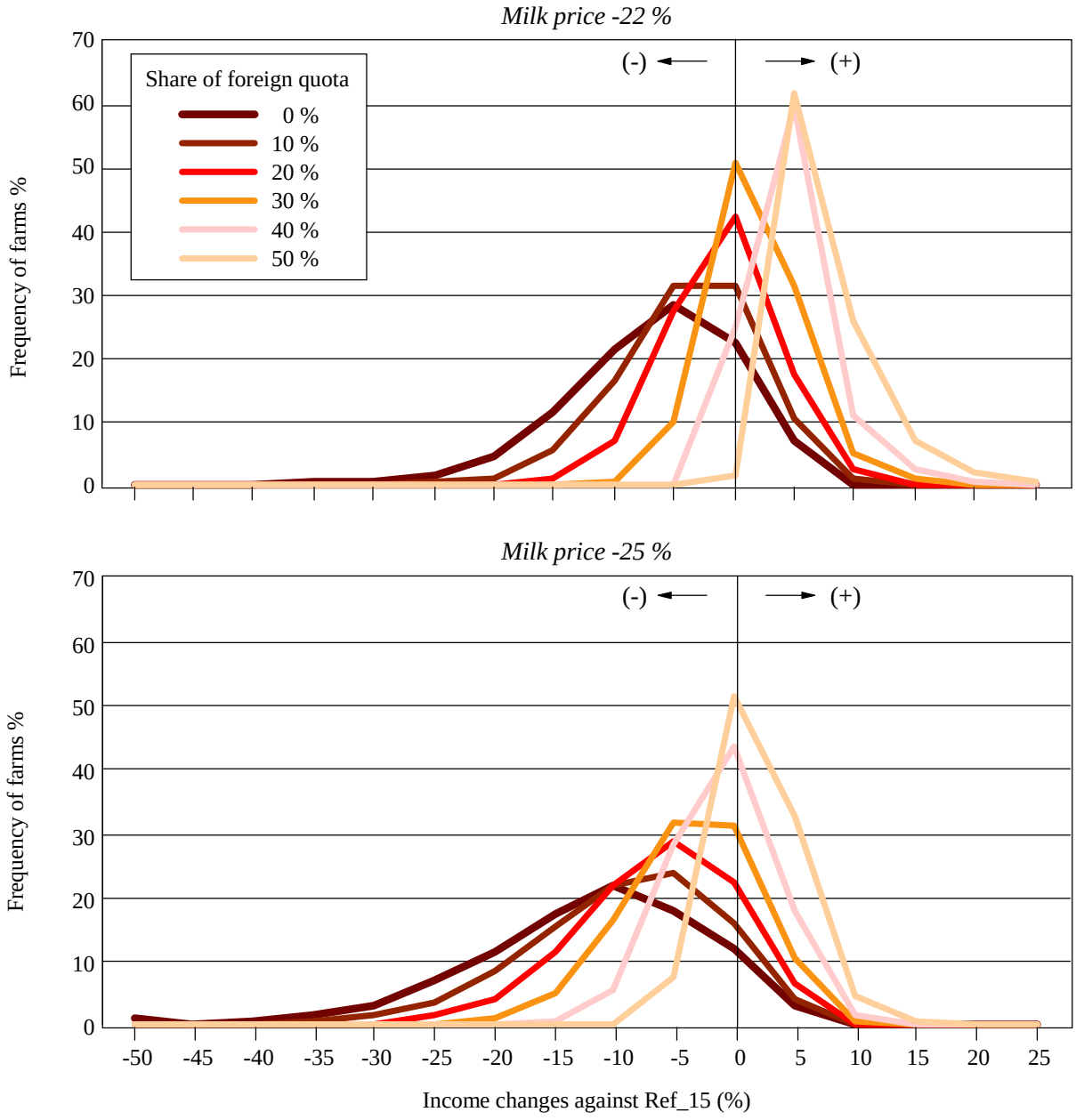
Source: BEMO, own calculations based on the national FADN.

In comparison to the latest stage of Agenda 2000 (Ref_15 without quota trade, savings of quota costs of € 50/ton corresponding to the lease price) income deficits are to be expected of 3.1 % with the exit from the milk quota regulation with a share of foreign quota of 10 %, while without consideration of the quota costs deficits of 5 % were to be registered. Vis-à-vis a foreign quota share of 20 % income deficits of only 1.2 % would be registered. In the case of higher foreign quota shares the savings of quota costs are so important that positive income effects are to be expected by the quota exit. Small enterprises would have only small positive income effects because they don't increase milk production considerably. Even with regard to the quota trade in the reference (Ref_15qh) positive income effects appear if the share of the foreign quota exceeds 40 %. Farms with 25 to 100 dairy cows, growing relatively strongly without the quota, have to expect the largest positive income effects.

Figures 5.4 and 5.5 show the frequency distribution of income changes in the scenarios of milk premia and grassland premia under conditions of milk price reductions of 22 and 25 % and shares of the foreign quota up to 50 % . With increasing shares of the foreign quota the frequency distribution narrows and shifts in the direction of positive income effects, thereby significant differences appear between both premia schemes:

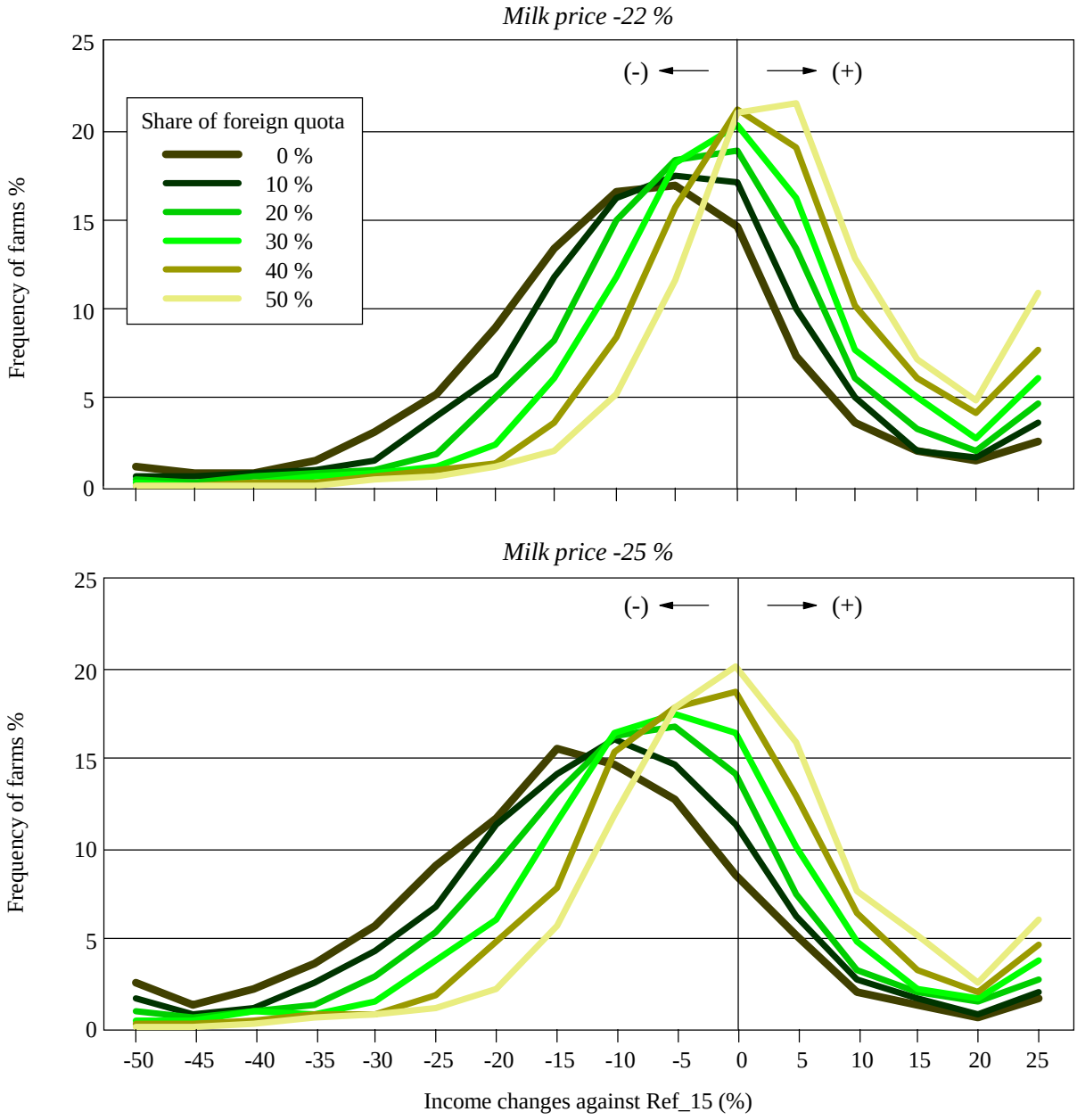
– With the milk premia (Mp_22) and with a 50 % share of the foreign quota positive income effects are to be expected on almost all farms. The income changes for Mp_25 range between ±5 % in the majority of the farms.
– With the grassland premia (Gp_22) comparable income effects with the milk premia appear on average. However, even with a 50 % share of the foreign quotas in approximately 30 % of the farms income losses of more than 5 % are to be expected. Therefore, the distribution effects of grassland premia are not essentially be reduced.

Figure 5.4: Distribution of income changes of a quota-exit including savings of quota costs (scenario 'milk premia')



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

Figure 5.5: Distribution of income changes of a quota-exit including savings of quota costs (scenario 'grassland premia')



Source: BEMO, own calculations based on the national FADN. Kleinhanss_2001-12-20

Distribution effects between former quota lessor and lease holders

The projected results[5] proven in Table 5.7 permit conclusions on the distribution of income effects between former lessors and lease holders of quota. Vis-à-vis the reference (with quota trade: Ref_15qh) income losses of € 0.562 billion (projected to all farms) would be expected for an exit from the milk quota regime (Mp_22), if savings of quota costs are excluded. With an increasing share of the foreign quota the losses recede strongly and with a 50 % share of the foreign quota, an income growth of € 81.8 million is to be expected. This precipitates from losses of € 71,6 million of former lessors (in Ref_15qh) and an income growth of € 153.4 million to the group of farms which in the reference would have taken on lease quotas. Winners of the exit from the milk quota regime are those farms, which in the past have grown with leased quotas while the lessor suffers due to the devaluation of quotas.

Table 5.7: Distribution of income effects of a quota-exit compared to the base (including quota trade)

	Aggregated [1] income effects of quota-exit [2] versus the base		
Share of foreign quota [3] %	Tenants of quota in the base Mio. €	Lessors [4] Mio. €	Total Mio. €
0	-416,5	-160,2	-579,5
10	-303,0	-142,3	-447,3
20	-189,4	-124,4	-315,2
30	-75,8	-106,5	-183,1
40	37,7	-88,6	-51,0
50	151,3	-70,7	81,2

1) Aggregated to the sector level. Kleinhanss_2001-12-20

2) Milk price -22 %.

3) Savings of quota costs 50.11 €/t of rented quota.

4) Farms being differentiated on the criteria 'renting-out' or 'renting' of quota.

Source: BEMO, own calculations based on the national FADN.

In the case of lower milk prices (-25 % in comparison to –11.2 % in Ref_15) positive income effects still appear when the share of the foreign quota in the reference is around 50 %.

The underlying range for the foreign quotas appears not to be unrealistic, because according to expert estimates, the share of foreign quotas in Germany amounts to approxi-

[5] Between farm's group results and sectorial results only small differences appear, which lead to a small inconsistency in the basis version BEMO and the model version for analysis of quota trade.

mately 50 %. The flexibility of the milk quota trade might contribute to an acceleration of the structural adjustments in milk production. Thus the share of the foreign quotas will increase and the expected reduction of the quota costs seem hardly to be reached.

The exit from the milk quota regulation has therefore the following advantages:

– Farm growth can be achieved without acquisition of ‘production rights’. This reduces the costs and also provides better planning security.
– The regional restriction for quota trade is elimininated and it will be possible to re-allocate milk production to favourable locations and to the most effective producers. Thus efficiency reserves might be mobilised, which are today prevented by administrative regulations.

For the quotas already acquired through purchase no direct savings can be realised. To retrieve active producers from burdens of high quota costs an early notification of the exit is essential to reduce purchase prices for quota in the transition period.

6 Effects on typical farms (TIPI-CAL)

Based on the methodical concept of TIPI-CAL/IFCN the effects on individual farms are examined for two possible scenarios of a quota exit. The analysis is carried out on the base of three typical farms. The development of farm income in the baseline (Agenda 2000) is compared with that under the conditions of an exit from milk quotas. The time period of the analysis are the years 1999 to 2008 (see Annex 2, Table A2.4).

Both scenarios for the exit of milk quota 'Milk premia' (Mp) and 'Grassland premia' (Gp) are analyzed with a milk price reduction of 22 %. First, the effects are discussed without considering farms' growth and adjustment strategies. In a further step adaptation possibilities and their income effects are assessed. It must be pointed out that possible transmission effects of direct payments depending on the type of premia were not considered. It can be expected that the introduction of milk premia can lead to higher quota prices despite of an early notification of a quota exit. In the long run grassland premia could induce higher rental and purchase prices for grassland.

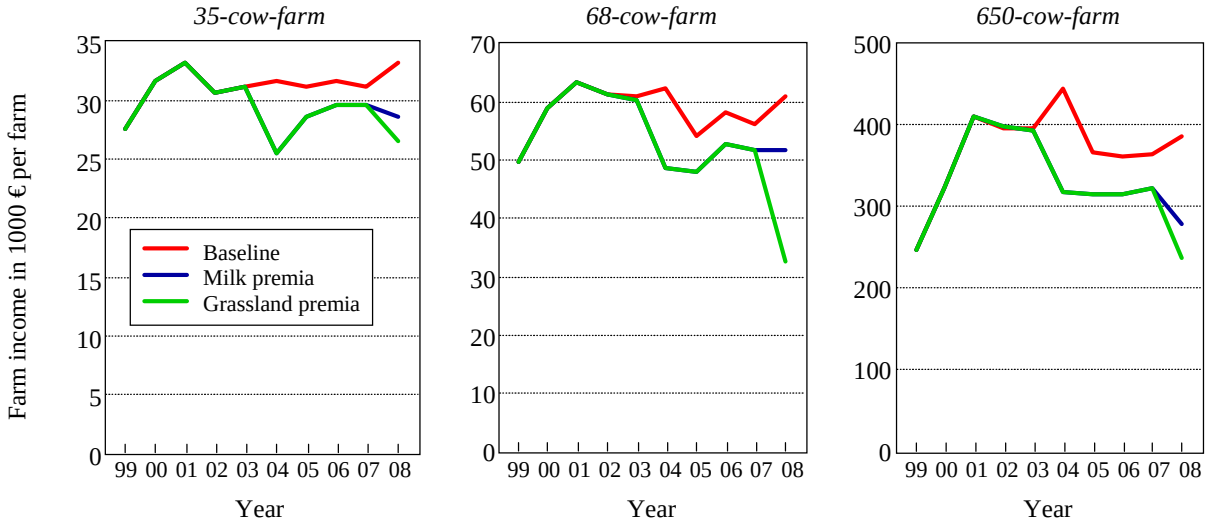
The results of the analysis cannot be assigned to all dairy farms in Germany. However they show how far the examined quota-exit scenarios could affect individual farms.

6.1 Effects of a quota exit without farm adjustments

The stepwise introduction of the milk market reform of Agenda 2000 including the quota trade introduced in the year 2000 is used as baseline. For the transmission period of a quota exit the first step of milk price reduction is realised in 2004. In the scenario milk premia (Mp) the milk premia is paid further even in the year 2008, while in the scenario grassland premia (Gp) in 2008 a premia per hectare of grassland is paid instead of milk and headage premia.

Figure 6.1 shows the development of farm income under conditions of both scenarios (for the description of farms see Annex 2, Table A2.2.). Referring to the 68 cow-farm, the development of farm income in the baseline is explained shortly. Increasing milk prices in the first three years induce higher profits. The decline of income in 2005 is to be traced back to the change in milk market policy. Despite a further reduction of milk prices in the year 2006, farm income increase, which results from the discontinued depreciation of machines, buildings and milk quota. The third and last step of milk market policy reform induce lower incomes. The higher income in 2008 is due to the increase of milk production, increasing productivity, rather stable milk prices and the discontinuation of quota amortization.

Figure 6.1: Impacts of different policy scenarios on typical farms



Source: Own calculations based on TIPI-CAL. Deeken_2001-12-20

In the baseline, the 35-cow-farm shows only slight income losses from 2005 to 2007, which likewise is to be traced back to the discontinued amortization. The extraordinary increase in profits of the 650-cow-farm in the year 2004 is a result of retrenchment of hired workers.

Both scenarios for a **quota exit** lead to milk price reductions compared to the baseline. In 2004 the producer price decreases vis-à-vis the year 1999 by about 6 % which is clearly stronger than for the baseline in 2005, therefore the output losses cannot be compensated (see Figure 6.1). In the year 2008 the impacts of both scenarios are quite different. While the abolition of milk quotas causes a further reduction in milk price, the milk premia in comparison to 2007 is not raised further. To be able to judge the scenarios corresponding to the exit from milk quotas, the differences between the scenarios are more important than the lapse of the present development path. For example, there is a large difference in the year 2004 between quota exit and the baseline, which diminishes in the following years. Reasons are the changes in milk market policy within Agenda put in place in 2005, by which the profit in the baseline likewise diminishes. Both scenarios of a quota exit differ only in the year 2008.

Table 6.1 describes the income effects in the year 2008 compared to the baseline. For the scenario Milk premia (Mp) increasing income losses with the size of the farms are to be observed. The milk price reduction of about 8 % between 2007 and 2008 is not compensated through additional milk premia.

Table 6.1: Changes in farm income of the whole farm in comparison to baseline in 2008

	Δ Farm income	
	Milk premia (MP)	Grassland premia (GP)
35-cow-farm	-17 %	-23 %
68-cow-farm	-15 %	-46 %
650-cow-farm	-28 %	-38 %

Jägersberg/Deeken-2001-12-20

In the scenario grassland premia the 68-cow-farm has to register higher income losses than the 650-cow-farm because of bull fattening. There is a strong under-compensation compared to milk and beef premia. Due to its relatively low share of grasslands it receives essentially less premia through grassland premia. The comparative advantage of a grassland premia is particularly dependent on the grassland share of the farm. In the year 2008 income losses would be about 30 % higher than for the scenario milk premia.

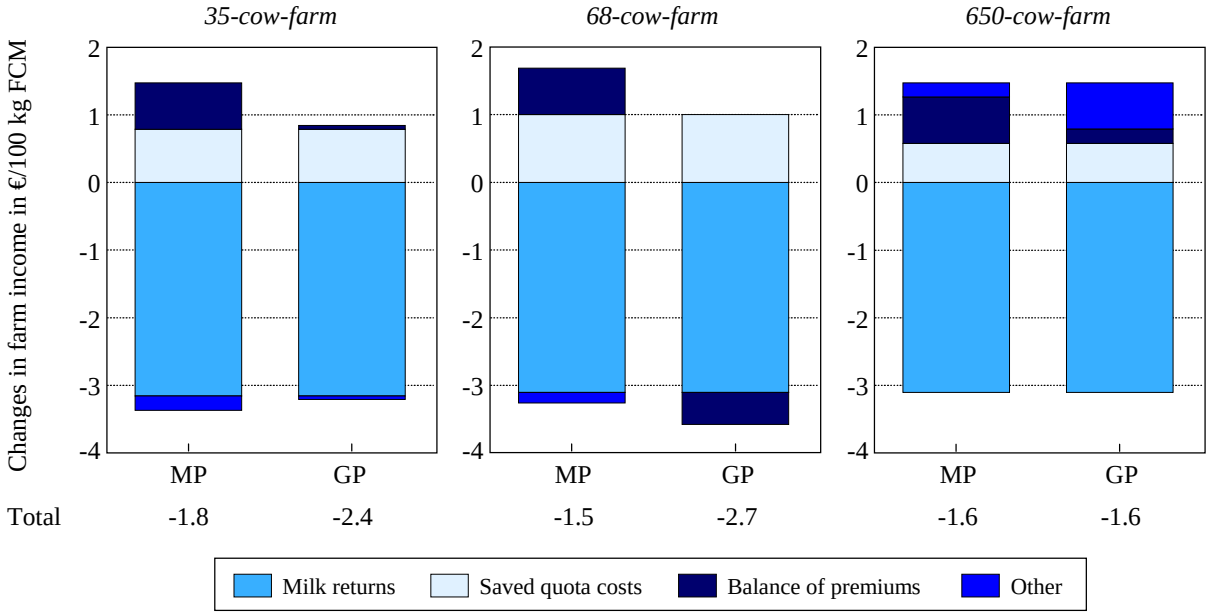
Figure 6.2 shows in detail the effects compared to the baseline referring to 100 kg of 4 % fat adjusted milk. The single effects amount to income losses per 100 kg of milk up to € 1.79 for the scenario milk premia and up to € 2.66 for the scenario grassland premia. The components 'others' result from different price projections for cereals and roughage fodder.

The effects of milk price reduction on the milk revenue and also the advantages through the saved quota costs per 100 kg of milk are independent from the considered scenarios of a quota exit. Vis-à-vis 1999 a milk price reduction of 22 % is taken as basis in both scenarios. The losses due to the milk price reduction vary between € 3.07 and € 3.17 per 100 kg FCM. The deviations between the farms are also influenced by savings of quota costs due to the regionally varying lease and purchase prices of quota and the unequalled shares of owned milk quota.

In the scenario 'milk premia' the premia vary between € 0.77 and € 0.72 per 100 kg milk (FCM). These differences are to be traced back to the conversion of slaughter premium per cow to milk. The slaughter bonus transferred to milk decreases with increasing milk productivity and increases with increasing replacement rate.

In the scenario 'grassland premia' € 353 per hectare of grassland is paid. However the premia per kg of milk quota and per slaughtered cow are replaced by this premia. Accordingly, the superiority of grassland premia is dependent on the grassland area per cow, the milk productivity per cow and the replacement rate of the farm.

Figure 6.2: Individual effects of the quota exit



FCM = Fat corrected milk (4 % fat).
Source: Own calculations based on TIPI-CAL. Deeken/Giffhorn_2001-12-20

Break – even grassland area

With respect to grassland premia, a farm seems to face not worse in comparison to the baseline, if the actual grassland area (hectares / cow) > = break-even grassland area.

Secondary calculation:

milk bonus (€/t)* milk production (ton/cow)
+ slaughter premia (€/cow)* replacement rate (%)
= bonus related to milk production (€/cow)
divided by the grassland premia (€/hectare)
= Break-even grassland area (hectare/cow).

This calculation is carried out for the 68-cow-farm in the following:

Milk yield in 2008 is 8,370 kg per cow. In the baseline the milk premia amount to € 25 / ton, the slaughter premium is € 100 per cow and the replacement rate is 28 %. 36 hectares of grassland are used.

Actual grassland area: 36 hectares/68 cows = 0.53 hectares/cow

Break-even grassland area: $\frac{\text{€ 25/ton* 8.37 tons + (€ 100/cow)* 0.28}}{\text{€ 353/hectare}}$

= 0.67 hectares/cow.

In the underlying example the actual grassland area lies below the break-even grassland area. The volume of direct payments for grassland premia corresponds only to the premia volume of the baseline when the actual grassland area is the same as the break-even grassland area. The income loss resulting from lower milk prices within the scope of the quota exit is not yet compensated, also the advantage through reductions of quota costs is not considered.

Summing up, it can be concluded that the three typical dairy farms would have income losses for both scenarios if farms were not adjusted to conditions of a quota exit. The transformation of milk and slaughter premia (baseline) to a grassland premia leads to higher losses for the 68-cow farm. Due to the agricultural location of this farm it has a low grassland share per cow, so that it receives lower premia in comparison to the baseline. The introduction of grassland premia leads accordingly to a greater discrimination of farms with larger cattle stock per hectare of grassland, higher milk productivity and higher remounting rates. Farms with other branches of business, like, for example, rearing of bulls are more affected by the transformation of milk and headage premia into a grassland premia.

6.2 Compensatory potentials of the farms

With the previous analysis it was assumed that the farms do not carry out growth and adjustment strategies within the scope of the quota exit. Most of the farms have however the potential to reduce costs and increase profits if quota were abolished. In the following the compensatory potential of the farms through farm adjustment after the abolition of the milk quota regime is shown. Two strategies are worked out:

– *Exploitation of the presently available stable capacities:* Expansion of milk production within the limits of the available stable capacities. It is assumed that no investment for stables and milk installations are necessary in this case.

– *Building of stables:* Additional expansion of production via building new stables.

The amount of free stable capacity and the typical regional growth strategies were ascertained in collaboration with local experts from extension services. Organizational changes for the different strategies are described in Annex 2, Table A2.3. Within the limits of the executed growth strategies no worsening of the production techniques (for example: replacement rate, death rate, veterinary costs per cow) is assumed. For a better comparability the organizational growth occurs in one step in 2008. The analyzed growth steps of the examined farms are described in Table 6.2.

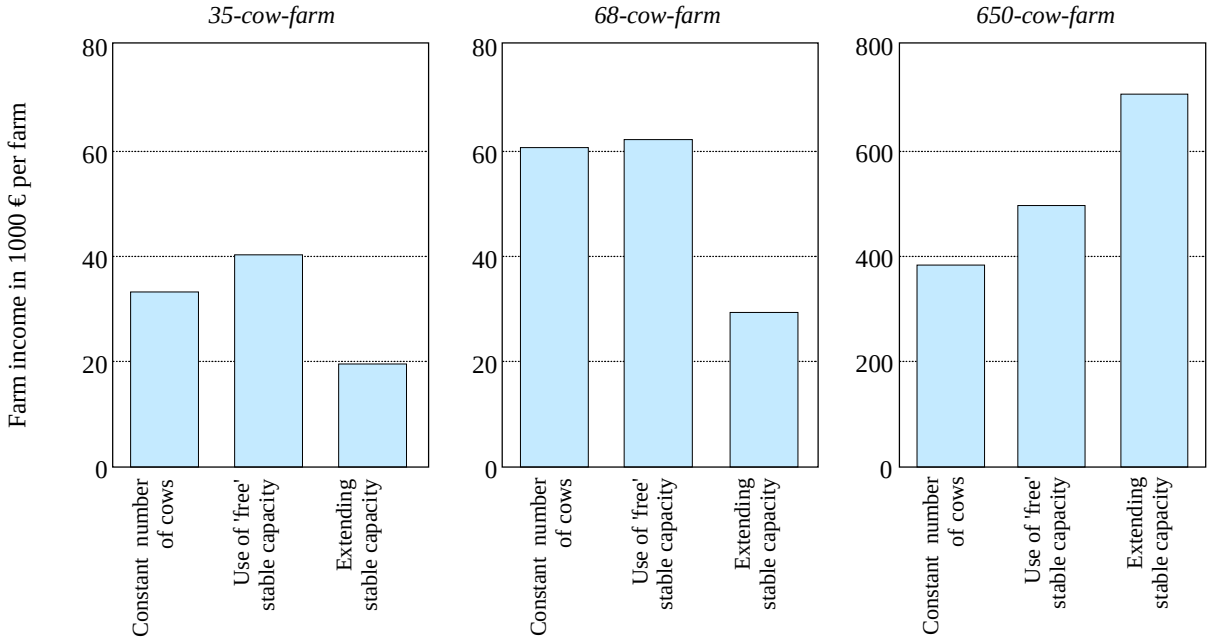
Table 6.2: Growth strategies of typical farms

	35-cow-farm	68-cow-farm	650-cow-farm
Using free capacity	45 cows	80 cows	1.000 cows
Additional milk production compared to baseline	29 %	18 %	54 %
Extension	60 cows	120 cows	1.500 cows
Additional milk production compared to baseline	72 %	76 %	130 %

Jägersberg/Deeken-2001-12-20

In Figure 6.3 the income effects of different growth strategies with the continuation of **Agenda 2000** are shown. For the baseline it is assumed that milk quotas must additionally be bought in 2008. In all three farms the use of free stable capacities lead to a higher profit. The farms with 35 or 650 cows can increase their profit by 20 or 30 %. With the 35-cow farm this can be explained by the increase of labour productivity. The 650-cow farm profits from its old buildings which enables to expand production by more than 50 %. Due to the intense growth in the past the 68-cow farm has only few free stable capacities and thereby has hardly any possibility to increase profits.

Figure 6.3: Farm income of typical farms in different growth strategies with Agenda 2000 in 2008

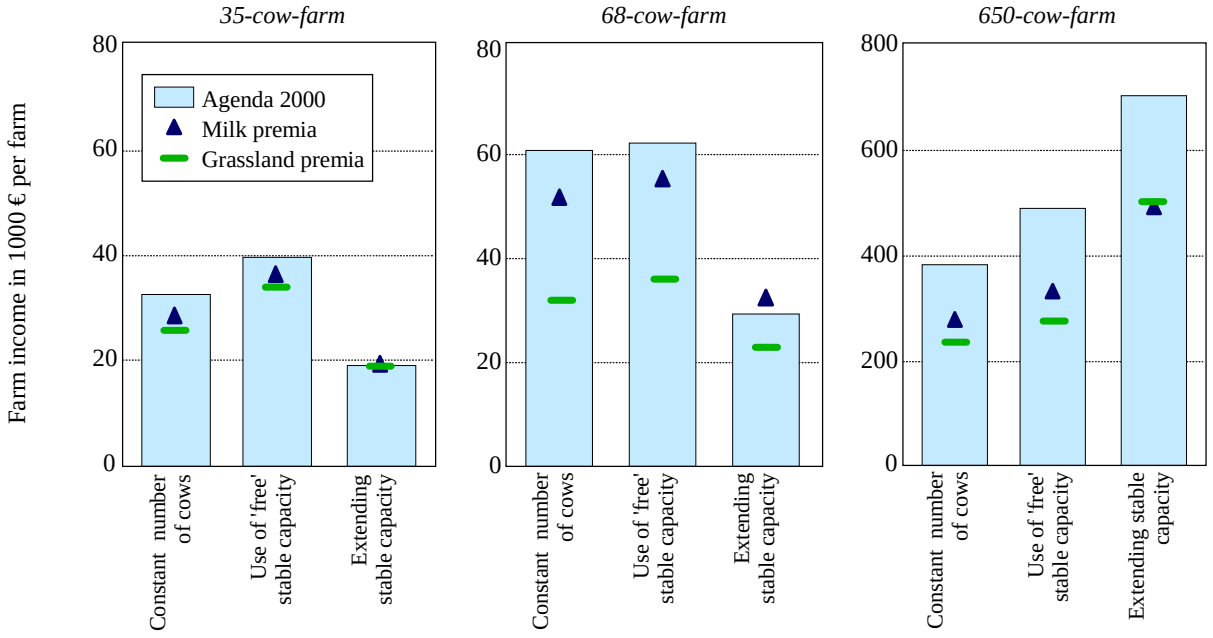


Source: Own calculations based on TIPI-CAL. Jägersberg/Deeken_2001-12-20

Investing into new stables is not favourable for the small farm. With such growth, the number of temporary workers and contract work would increase, so that the higher revenues are to a large extent absorbed through additional costs. The 650-cow-farm can strongly increase its profit due to the liquid funds it has by investing in additional stables. However, such growth is hardly achievable without a cut in the replacement rate, death rate, milk quality, etc. A further condition is that the feasibility of the growth strategies under the Agenda conditions is only given, when milk quota can be additionally bought through milk quota trade; this will be hardly possible especially for the 650-cow farm.

In the scenario with **milk premia** the growth occurs without further increasing of quota costs. On the other hand the farms receive milk premia as per assumption only up to the level of available quota in 2007. With a growth under the conditions of **grassland premia**, no quota costs accrue. However, all headage and milk premia are replaced by a uniform premia per hectare of grassland (see Figure 6.4). The option 'constant cow number' shows income losses (already depicted in Chapter 6.1) in comparison to the baseline. The losses can, however, be partly balanced through the corresponding organizational adjustments. The 35-cow farm can compensate the profit decline for example through the use of free stable capacity. The other two farms can compensate only half of the losses through these strategies.

Figure 6.4: Farm income of typical farms in different growth strategies with Agenda 2000 and quota exit



Source: Own calculations based on TIPI-CAL. Jägersberg/Deeken_2001-12-20

Especially for the 68-cow farm strong differences of income effects between milk and grassland premia exist. Increasing the cow number up to 120 by building new stable capacities the farmer would stop bull rearing. For the scenario milk premia positive effects can be considered compared to the baseline for the same strategy. The income losses through the scenario grassland premia clearly decrease.

The improvement in the manager's ability could not be considered until now. It would be interesting to quantify the management potential (for example improvement of herd management, fodder production and arrangement of fodder). The difference reconciles the efficiency of the typical farms to the top quarter of representative farms. This difference amounts between € 5.11 and 7.67 per 100 kg milk measured in profit + outside wages + land lease (Annex 2, Figure A2.1). Also, when it is not possible to add this amount directly to profit, a possible management potential shall of course be considered.

This computation for typical farms does not show income effects of a quota exit for shares of foreign quota greater than 20 % as discussed in Chapter 5.5. With the introduction of milk quota trade in the year 2000 it was assumed that the typical farms can make use of the take-over rights of the currently leased milk quota. Hence the lease share is largely below 10 % and can furnish no testimony to this statement of problem.

6.3 Summary

The three typical farms would be negatively affected through the examined scenarios of a quota exit if farm adaptations are not considered. Income losses would be in the range of 30 % for the scenario milk premia respectively 45 % for grassland premia. With growth strategies, especially through the use of free stable capacities it is possible to compensate for at least a portion of the losses.

The results for an exit from the milk quota regime are linked to a milk price reduction of 22 % vis-à-vis year 1999. However, through the system change from intervention price to a safety net a larger price decrease could occur at least in the short run. Before deciding to invest a sensitivity analysis should be carried out; it must be ensured that the investment is profitable even with lower milk prices.

7 Summary and conclusions

The milk quota regime was introduced in 1984 with the objective of eliminating the surplus production of milk and the resulting problems in the milk market. In addition, it aimed at protecting the income of dairy farms. For a couple of years now, opposition to the milk quota regime has been growing and increasingly the abolition of the regime is being called for. The Agenda 2000 provides for a revision of the milk market regulations within the framework of the mid term-review in 2002/2003, aiming at the abolishment of the quota regime after 2006. Four member states of the EU have declared their resistance to the continuation of the milk quota regime. They have established the working group ‚CAPRI' to work out suggestions for the abolition of the milk market regime.

In Germany, the milk quota regime is increasingly being criticised by farms aspiring to grow:

– Nowadays, the capacity of the quota regime to fulfil its function of protecting the income of dairy farms is limited. Since the introduction of the quota regime, approximately half of the sectoral milk quota has been transferred to other farms due to the unfavourable farm structure in the base. The transfer of production rights has benefited not only the growing farms, but also the lessors of the quota, since part of the quota rent is passed on to the former owners. Administrative limitations of the quota trade have additionally raised the quota prices. The increased flexibility of the quota trade introduced in 2000 has not led to any fundamental change in the situation.

– The quota regime hampers structural change and raises the costs of adjustments necessitated by the increasing globalisation.

– Due to the economic pressure expected to result from the milk market reform of Agenda 2000, some of the farms will no longer be able to produce milk profitably. Therefore the quota trade increasingly gains in economic importance. The abolition of the regional limitation of the quota trade in Germany would lead to positive income effects, and would give an indication of the shift in milk production following a phase out of the quota regime.

An exit from the quota regime would be facilitated by a preceding devaluation of the milk quota. In this respect, the reduction of the support price level for milk, accompanied by transfer payments as a partial compensation for ensuing losses in revenues as envisioned by the Agenda 2000, can be seen as a starting point. To avoid a structural break, framework conditions should be changed step by step. The transition phase should aim at leading towards the market equilibrium expected to result after an exit from the milk market regime. The transfer payments should be designed to be as far as possible decoupled from the quotas and from the production. A timely notification of the phase out is necessary, so that the farms can adjust to the future frame conditions.

Preconditions for an abolishment of the milk quota regime were as far as possible isolated, and the consequences (supply and income effects) assessed, by use of the FAL network of market, regional and farm models. The main challenges were to realistically model the adaptation potentials of the farms, and to estimate the utilisation of these potentials.

Several scenarios were analysed, referring to: the Agenda 2000 as the reference; the implementation of a transition period 2004/05 to 2007/08 for the abolishment of the milk quota; the abolishment of the quota in 2008 accompanied by milk price reductions of 22, 25 and 30 % respectively as well as transfer payments by the way of milk or grassland premia. For all analysed premia systems the premium levels were calculated to be consistent with a common upper limit of the sectoral premia volume.

Based on the model analyses, the following **supply effects** can be expected to result from the abolishment of the milk quota:

– The market model indicates that the new equilibrium for the EU will see the milk prices reduced by approximately 25 %, while supply increases by 5 %. The farm based models for Germany imply an increase in milk production of up to 10 %, depending on the level of milk price reductions and the design of the transfer payments. Production will be reallocated to the more competitive regions, and farms with small cow herd sizes will cut their milk production at higher milk price reductions. Total costs of milk production can not always be covered, causing large farms with a high proportion of paid labour and rented land to curtail their output as well.

– In the scenarios with a milk premia, the development of beef production is largely determined by the change of the supply of the by-product ‘cow-meat‘, while in the scenarios with a grassland premia, a significant reduction of beef production as well as an increase in grassland use are to be expected.

If farmers' expenses for the milk quota are not taken into account, the abolishment of the milk quota will have a negative effect on farm income. The reduction in income depends on the level of milk price reductions, production costs, transfer payments and adjustments of production. The higher the share of rented quota, the higher the positive income effects for the individual farmer that can be expected from the elimination of quota costs. Positive income effects are realised by active milk producers, while former lessors will incur losses due to the devaluation of the quota.[1]

[1] The purchase of milk quota can result in significant financial obligations, which may continue to burden the farms after the phase out of the quota regime. Introducing a special depreciation on purchased quota could improve the liquidity of the respective farms and facilitate higher investments.

The analysis of the different direct payment systems leads to the following conclusions:

– **Milk premia** have the smallest distribution effect due to their linkage to the production volume; the income effects depend on the level of compensation and the basis used for the derivation of a ceiling for premia payments (reference). The limitation of premia payments has the same effect as staggered prices and reduces the incentives of decreasing production below the reference level (since up to this level, the incentive price is the sum of market price and premia), while at the same time any production in excess of the reference quantities will only realise the lower milk prices. Without this limitation, the increase in milk supply would be higher, in turn inducing a further fall of milk prices. A problem may be posed by the possibility that farmer calculate and use an 'average price' for decision making. This would result in a higher milk production, again leading to falling milk prices and income losses. The design of the milk premia should take care not to replicate the problems of the quota regime by creating 'premia rights'.

– In comparison, the introduction of **grassland premia** results in similar supply effects for milk, but leads to a significant reduction of beef production and stronger income distribution effects. In addition, the following aspects for grassland premia schemes shall be mentioned:
  - Grassland premia allow a further decoupling of transfers payments, and are also more easily administrated. They reduce the distortions of the competitiveness of grassland and maize for silage
  - The competitiveness of milk and beef production will to a larger extent be influenced by the market and less by the process-specific design of the premia
  - Income adjusted for transfer payments is slightly higher, indicating positive allocation effects.
  - A disadvantage is the transmission of a part of the premia to landlords through an increase in rental prices. The income effects of the transfer payments will be the lower the higher the share of rented grassland. In the base of grassland approximately 40 %[2] is rented. In the course of future agricultural structural change, an increase in transmission effects is to be expected.

The regional distribution effects may be mitigated by regionalising the level of grassland premia. In addition, a combination of livestock and area based payment systems is conceivable, but such payments need to be co-ordinated harmoniously. Such combined premia systems would further increase the administrative burden.

[2] Source: Statistisches Bundesamt, Fachserie 3, Reihe 2.1.6 Eigentums- und Pachtverhältnisse 1997.

On the basis of the model calculations, the following **conclusions** can be drawn:

1. The abolishment of the milk quota seems feasible, provided that the general conditions are set accordingly:
   - Early announcement and preparation of the abolishment of the quota by implementing a transitional period of several years (earlier implementation of the milk market reform than planned under Agenda 2000, continuation and modification of the respective policy instruments)
   - Devaluation of the quota by reducing support price levels
   - Decoupling of transfer payments from production as far as possible

2. The use of premia which are related to the production volume and which mainly focus on the compensation of income losses as compared to the previous agricultural policy has to be restricted to a transitional period. Partly decoupled systems via grassland premia possess certain advantages. Compatibility to WTO regulations could be ensured by a respective design of the schemes. Last but not least, the grassland premia could be designed to enhance the production of positive external effects.

3. The results indicate that milk production will be increased by up to 10 %. For more decoupled premia (e. g. grassland premia), a higher reduction of beef production is to be expected, which in turn will effect beef prices.

4. The extent of income losses is largely dependent on the development of the farm gate price for milk. Sectoral income losses are to be expected if reductions in quota expenses are not taken into account. For grassland premia, regional distribution effects are greater than for milk premia. Reduced quota costs will lead to positive income effects for farms where the share of rented quota exceeds 20 %. Income losses will be incurred by former lessors, i. e. those farmers which under the current milk market regime realise a higher income by selling or lending quota than by utilising the quota themselves.

The abolishment of the milk quota, accompanied by a reduction of support price levels and a corresponding design of the general conditions and the transition period, will especially benefit active milk producers.

8 References

Barkaoui, A.; Buttault, J. P.; Guyomard, H. (1996): Mobilité des droits à produire dans l'UE: conséquences d'un marché des quotas laitiers à léchelle régionale, nationale ou communautaire. VII th Conference de l'European Association of Agricultural Economics. Edinbourg.

Benjamin, C.; Gohin, A.; Guyomard H. (1999): The Future of EU Dairy Policy. - Dairy Research Symposium „National and Trade Dairy Policies: Implications for the Next WTO Negotiations", October 8-9, Kansas City, INRA-ESR, Rennes.

Bouamra Mechemache, Z.; Réquillart, V. (1999): Policy Reform in the European Union Dairy Sector. – Policy Research Symposium „National and Trade Dairy Policies. Implications for the Next WTO Negotiations", October 8-9, Kansas City, INRA-ESR/MAIA, Castanet Tolosan.

Bouamra Mechemache, Z.; Réquillart, V. (2000): Analysis of EU Dairy Policy Reform. INRA–ESR/MAIA, February, Castanet Tolosan.

Bundesministerium für Ernährung, Landwirtschaft und Forsten (2000): Statistisches Jahrbuch über Ernährung, Landwirtschaft und Forsten in der Bundesrepublik Deutschland, Landwirtschaftsverlag Münster-Hiltrup.

Chatzis, A.(1997): Flächenbezogene Ausgleichszahlungen der EU-Agrarreform. Pachtmarktwirkungen und Quantifizierung der Überwälzungseffekte. Agrarwirtschaft, SH 154. Holm: Agri Media.

Colman, D.; Burton, M. P.; Rigby, D. S.; Franks, J. R. (1998): Economic Evaluation of the UK Milk Quota System. Centre for Agricultural, Food and Resource Economics School of Economics Studies, The University of Manchester.

Cypris, Ch.; Kleinhanss, W.; Kreins, P.; Manegold, D.; Sander, R.; Meudt, M. (1997): Modellrechnungen zur Weiterentwicklung des Systems der Preisausgleichszahlungen. Arbeitsmaterial der Forschungsgesellschaft für Agrarpolitik und Agrarsoziologie e. V., Band 3, Bonn.

Deblitz, C.; Hemme T.; Isermeyer, F.; Knutson, R.; Andersson, D. (1998): International Farm Comparison Network (IFCN) – Ziele, Organisation, erste Ergebnisse für die Milchproduktion. Kurzfassung des IFCN-Reports 1/98, Institut für Betriebswirtschaft der FAL, Braunschweig.

Hemme T. (2000): Ein Konzept zur international vergleichenden Analyse von Politik- und Technikfolgen in der Landwirtschaft. Landbauforschung Völkenrode, Sonderheft 215, Braunschweig.

Jacobs, A. (1998): Paralleler Einsatz von Regionen- und Betriebsgruppenmodellen in der Agrarsektoranalyse. Angewandte Wissenschaft, Heft 470, Schriftenreihe des Bundesministeriums für Ernährung, Landwirtschaft und Forsten, Bonn.

Landwirtschaftskammer Weser-Ems (2001): Vorschlag zur Fortentwicklung der Prämienregelung – Einführung einer Grünlandprämie. Oldenburg.

Osterburg, B.; Offermann, F.; Kleinhanss, W. (2000): A sector consistent farm group model for german agriculture. In: Heckelei, T., Witzke, H.-P. and Henrichsmeyer W.: Agricultural sector modelling and policy information systems. Wissenschaftsverlag Vauk, Kiel.

Schleef, K.-H. (1999): Modellgestützte Abschätzung der betrieblichen Auswirkungen von Politiken zur Verringerung von Stickstoffüberschüssen aus der Landwirtschaft. Angewandte Wissenschaft, Heft 482, Schriftenreihe des Bundesministeriums für Ernährung, Landwirtschaft und Forsten, Landwirtschaftsverlag Münster-Hiltrup.

Annex 1 BEMO and RAUMIS

Table A1.1: Costs for dairy stable places

Cow size class	Investment € per stable place		Annual costs €/place
	Gartung [1)]	Assumption [2)]	Assumption [3)]
20 - 40	5,945	2,854	248
40 - 60	4,905	2,354	205
60 - 120	4,261	2,045	178
120 - 180	3,976	1,908	166
> 180	3,835	1,841	161

1) Gartung, J. ,Uminski, K., Preiß, F.: Investitionsbedarf für Milchviehlaufställe, Mastbullenställe sowie Kälber- und Rinder-Jungviehställe. Landbauforschung Völkenrode, SH 173 (1997).

2) Assumption: Reduction of investment by 52 %.

3) Annuity: Using periode 20 years; interest 6 %. Kleinhanss_2001-12-20

Table A1.2: Production and income in the base situation (Ref_15)

		Cow size class				
		Average	<25	25 - 50	50 - 100	>100
Milk production	qn	2,049	779	1,962	3,980	18,293
Beef production	qn	55	33	52	86	373
Direct payments	1,000 €	20	9	14	26	306
Income	1,000 €	54	29	47	77	537

Remark: Weighted averages using weighting factors. Kleinhanss_2001-12-20

1) Excluding premias for agri-environmental programs and for less favoured areas.

Source: BEMO, own calculations based on the national FADN.

Table A1.3: Consequences of an abolishment of the milk quota regime in different regions - Results of the regional model RAUMIS (Part 1)

		North						
Scenario		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Crop and animal production			*relative change to the refence (%)*					
Grandes Cultures	1,000 ha	2,700	*-0.6*	*-0.4*	*-0.2*	*-1.5*	*-1.5*	*-1.4*
Maize for silage	1,000 ha	378	*7.2*	*5.4*	*2.4*	*-1.8*	*-3.7*	*-7.1*
Other forage production	1,000 ha	136	*17.6*	*13.2*	*6.2*	*32.2*	*30.6*	*28.0*
Grassland area (total)	1,000 ha	1,427	*2.3*	*2.2*	*1.7*	*3.4*	*3.1*	*3.0*
... Intensive grassland	1,000 ha	1,331	*3.6*	*3.2*	*2.4*	*-0.6*	*-2.8*	*-8.2*
... Extensive grassland with AEP [1)]	1,000 ha	74	*-9.8*	*-7.6*	*-4.5*	*10.2*	*15.4*	*25.2*
... Extensive grassland without AEP	1,000 ha	23	*-35.0*	*-27.7*	*-14.0*	*212.0*	*306.6*	*578.3*
Fallow [2)]	1,000 ha	77	*-45.0*	*-42.5*	*-33.5*	*-53.8*	*-49.5*	*-46.7*
Milk cows	1,000 heads	1,339	*12.4*	*9.5*	*5.4*	*15.6*	*11.9*	*5.9*
Suckler cows	1,000 heads	243	*-7.9*	*-3.0*	*0.4*	*-52.3*	*-47.0*	*-38.3*
Bulls for fattening	1,000 places [3)]	1,114	*2.8*	*2.3*	*1.4*	*-3.1*	*-3.4*	*-5.2*
Output								
Beef production	1,000 t	539	*4.5*	*3.8*	*2.4*	*-0.5*	*-1.6*	*-3.9*
Milk production	1,000 t	9,872	*12.2*	*9.3*	*5.2*	*15.4*	*11.8*	*5.8*
Income								
Net value added (in terms of factor cost)	Mio. €	4,719	*-4.7*	*-7.1*	*-10.8*	*-6.2*	*-8.7*	*-12.7*
Net value added per work unit [4)]	1,000 €	29,777	*-7.8*	*-9.5*	*-12.1*	*-8.4*	*-10.0*	*-12.4*
Direct Payments					in Mio. €			
Total premia	Mio. €	2,042	2,125	2,126	2,124	1,945	1,942	1,938
... Premia Grandes Cultures	Mio. €	1,035	1,028	1,031	1,035	1,037	1,038	1,039
... Grassland premia	Mio. €	10	9	9	10	595	594	593
... Beef Premia (total)	Mio. €	688	770	771	769	15	16	16
... Milk Premia	Mio. €	318	424	424	424	0	0	0

		Centre						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Crop and animal production			*relative change to the refence (%)*					
Grandes Cultures	1,000 ha	688	*-0.1*	*0.0*	*0.1*	*-4.2*	*-4.2*	*-4.1*
Maize for silage	1,000 ha	35	*6.6*	*4.5*	*1.6*	*-10.1*	*-11.6*	*-14.3*
Other forage production	1,000 ha	19	*8.7*	*3.1*	*-1.9*	*182.0*	*181.4*	*179.9*
Grassland area (total)	1,000 ha	568	*2.0*	*1.5*	*0.7*	*4.1*	*4.1*	*4.0*
... Intensive grassland	1,000 ha	378	*11.8*	*9.3*	*3.9*	*-53.2*	*-58.9*	*-68.1*
... Extensive grassland with AEP [1)]	1,000 ha	114	*-1.3*	*-0.5*	*0.4*	*10.1*	*10.7*	*11.4*
... Extensive grassland without AEP	1,000 ha	76	*-41.9*	*-34.3*	*-15.4*	*280.2*	*307.9*	*352.3*
Fallow [2)]	1,000 ha	29	*-38.7*	*-29.4*	*-12.8*	*-79.8*	*-79.8*	*-79.0*
Milk cows	1,000 heads	277	*13.8*	*9.7*	*3.3*	*13.5*	*9.1*	*1.9*
Suckler cows	1,000 heads	136	*-5.5*	*-3.1*	*-0.2*	*-55.5*	*-52.6*	*-47.2*
Bulls for fattening	1,000 places [3)]	144	*6.4*	*4.8*	*1.7*	*-13.8*	*-14.9*	*-17.4*
Output								
Beef production	1,000 t	91	*6.8*	*5.0*	*1.9*	*-9.8*	*-11.6*	*-14.6*
Milk production	1,000 t	1,857	*13.7*	*9.7*	*3.2*	*13.4*	*9.0*	*1.8*
Income								
Net value added (in terms of factor cost)	Mio. €	1,166	*-2.9*	*-4.9*	*-7.9*	*4.4*	*2.4*	*-0.7*
Net value added per work unit [4)]	1,000 €	16,895	*-4.9*	*-6.3*	*-8.3*	*5.1*	*3.8*	*1.8*
Direct Payments					in Mio. €			
Total premia	Mio. €	491	510	510	508	579	579	578
... Premia Grandes Cultures	Mio. €	241	241	241	241	231	231	231
... Grassland premia	Mio. €	17	16	17	17	246	246	246
... Beef Premia (total)	Mio. €	139	156	156	155	8	8	8
... Milk Premia	Mio. €	26	35	35	35	0	0	0

Table A1.3: Consequences of an abolishment of the milk quota regime in different regions - Results of the regional model RAUMIS (Part 2)

		East						
Scenario		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Crop and animal production			*relative change to the refence (%)*					
Grandes Cultures	1,000 ha	3,346	*0.2*	*0.2*	*0.2*	*-1.0*	*-1.0*	*-1.0*
Maize for silage	1,000 ha	255	*4.0*	*2.1*	*0.1*	*-9.4*	*-11.5*	*-14.7*
Other forage production	1,000 ha	196	*2.3*	*0.8*	*-0.6*	*26.5*	*25.4*	*23.1*
Grassland area (total)	1,000 ha	1,034	*1.9*	*1.4*	*0.7*	*6.8*	*6.7*	*6.7*
... Intensive grassland	1,000 ha	494	*4.1*	*2.9*	*1.2*	*-37.2*	*-42.5*	*-50.2*
... Extensive grassland with AEP [1]	1,000 ha	459	*0.9*	*0.6*	*0.4*	*11.9*	*12.2*	*12.6*
... Extensive grassland without AEP	1,000 ha	82	*-5.3*	*-2.9*	*-1.1*	*244.4*	*274.5*	*318.5*
Fallow [2]	1,000 ha	91	*-28.1*	*-21.3*	*-11.3*	*-85.5*	*-84.5*	*-82.6*
Milk cows	1,000 heads	774	*8.2*	*4.3*	*0.8*	*12.8*	*8.4*	*1.5*
Suckler cows	1,000 heads	306	*-9.5*	*-5.3*	*-0.8*	*-54.8*	*-51.0*	*-43.2*
Bulls for fattening	1,000 places [3]	236	*4.6*	*3.2*	*1.3*	*-10.9*	*-11.7*	*-14.2*
Output								
Beef production	1,000 t	190	*4.2*	*2.6*	*0.9*	*-6.1*	*-7.9*	*-10.6*
Milk production	1,000 t	5,956	*8.2*	*4.2*	*0.8*	*12.6*	*8.3*	*1.4*
Income								
Net value added (in terms of factor cost)	Mio. €	2,368	*-3.7*	*-6.7*	*-11.0*	*2.4*	*-1.0*	*-5.9*
Net value added per work unit [4]	1,000 €	12,939	*-4.6*	*-7.2*	*-11.1*	*2.2*	*-0.7*	*-4.9*
Direct Payments					in Mio. €			
Total premia	Mio. €	1,982	2,036	2,037	2,037	2,138	2,137	2,134
... Premia Grandes Cultures	Mio. €	1,310	1,311	1,311	1,312	1,297	1,297	1,298
... Grassland premia	Mio. €	74	74	74	74	560	559	558
... Beef Premia (total)	Mio. €	339	388	389	391	18	18	18
... Milk Premia	Mio. €	132	175	175	175	0	0	0

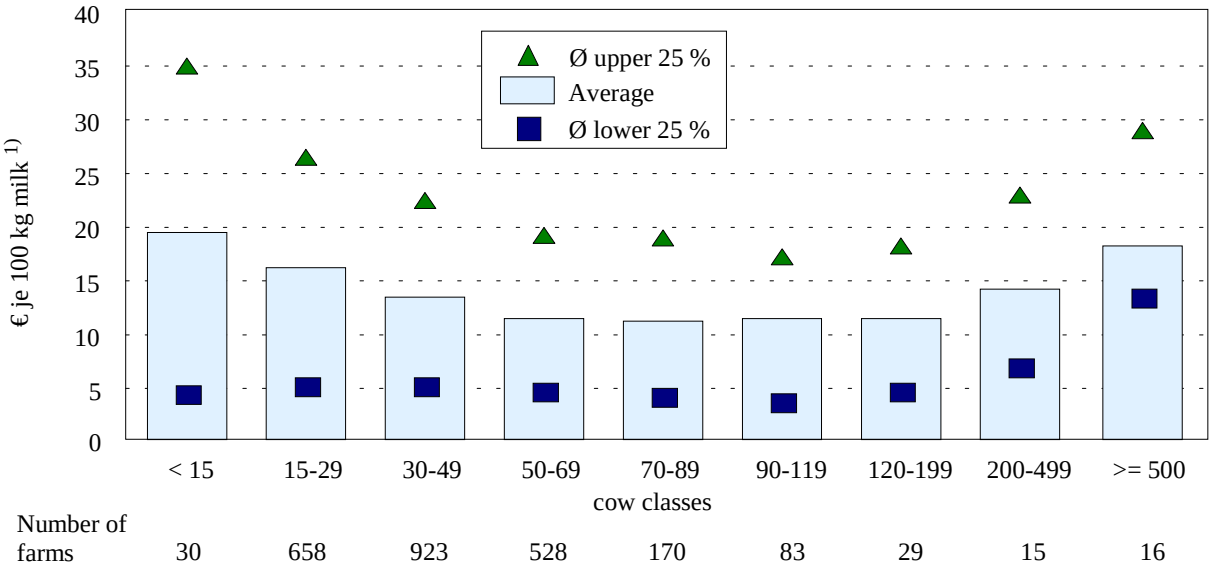
		South						
		Reference	MP_22	MP_25	MP_30	GP_22	GP_25	GP_30
Crop and animal production			*relative change to the refence (%)*					
Grandes Cultures	1,000 ha	2,300	*-0.2*	*0.0*	*0.1*	*-2.0*	*-1.9*	*-1.8*
Maize for silage	1,000 ha	307	*4.1*	*2.5*	*0.3*	*-4.1*	*-5.9*	*-8.9*
Other forage production	1,000 ha	192	*4.7*	*2.4*	*-0.4*	*29.8*	*28.4*	*26.1*
Grassland area (total)	1,000 ha	1,581	*1.3*	*1.0*	*0.6*	*2.6*	*2.5*	*2.5*
... Intensive grassland	1,000 ha	699	*5.8*	*4.3*	*1.9*	*-12.4*	*-16.1*	*-24.4*
... Extensive grassland with AEP [1]	1,000 ha	790	*0.0*	*0.0*	*0.2*	*3.7*	*4.1*	*4.8*
... Extensive grassland without AEP	1,000 ha	92	*-22.7*	*-15.3*	*-5.9*	*107.3*	*130.7*	*186.4*
Fallow [2]	1,000 ha	86	*-25.6*	*-20.9*	*-12.4*	*-49.8*	*-48.8*	*-47.1*
Milk cows	1,000 heads	1,596	*6.2*	*3.9*	*1.1*	*6.2*	*3.3*	*-1.9*
Suckler cows	1,000 heads	181	*-3.0*	*-0.9*	*1.5*	*-42.0*	*-36.5*	*-28.6*
Bulls for fattening	1,000 places [3]	718	*3.2*	*2.2*	*0.4*	*-4.3*	*-5.3*	*-7.9*
Output								
Beef production	1,000 t	432	*3.7*	*2.5*	*0.7*	*-2.3*	*-3.8*	*-6.7*
Milk production	1,000 t	9,448	*6.2*	*3.9*	*1.1*	*6.2*	*3.3*	*-1.9*
Income								
Net value added (in terms of factor cost)	Mio. €	3,275	*-6.9*	*-9.9*	*-14.4*	*-5.5*	*-8.5*	*-13.0*
Net value added per work unit [4]	1,000 €	19,550	*-9.2*	*-11.3*	*-14.8*	*-6.0*	*-7.9*	*-10.6*
Direct Payments					in Mio. €			
Total premia	Mio. €	1,892	1,983	1,979	1,973	2,001	1,998	1,992
... Premia Grandes Cultures	Mio. €	904	899	900	902	892	892	893
... Grassland premia	Mio. €	102	102	102	102	766	765	764
... Beef Premia (total)	Mio. €	557	643	640	636	17	17	17
... Milk Premia	Mio. €	263	351	351	351	0	0	0

1) With direct payments related to agri environmental programmes (AEP).
2) Mainly fallow of grassland.
3) Occupied housing capacity.
4) Demand for labour is modelendogenously calculated.
Source: Calculations based on RAUMIS.

Osterburg, FAL-BAL (2001)

Annex 2 TIPI-CAL

Figure A2.1: Profitability of the German FADN-farms (1997/98) (Farm Accountancy Data Network)



1) Farm income + paid wages + land rents
Source: Own calculations based on FADN.

Jägersberg, FAL-BAL (2001)

Table A2.1: Profitabilty of typical farms in relation to German FADN-farms

FADN-farms			
Cow classes	**30-49**	**50-69**	**>500**
Farm income [1]: Ø upper 25 %	22	19	29
Ø total	14	12	19
Typical farms			
No. of cows	**35**	**68**	**650**
Farm income [1]:	15	13	24

1) Farm income + paid wages + land rents in €/100 kg Milch in the year 1999.

Table A2.2: Description of the typical farms in 1999

Region		South	North	East
Kind of farm		Family farm	Family farm	ltd. Company
No. of cows		35	68	650
Farm description				
Total amount of land	ha	35	90	1,700
Share of grassland	% of total land	71	40	32
Share of forage area	% of total land	88	69	46
Crop enterprise	% of total land	12	31	54
No. of employed workers	unit	-	0.2	34.5
No. of family units	unit	1.7	2.0	-
Other enterprises		-	Rearing beef bulls	-
Barn built in		1975	1981	1993
Dairy specific data				
Milk yield	kg FCM/cow [1)]	6,310	7,616	7,712
Milk price	€/100 kg FCM	29.3	28.4	28.6
Milk quota	t	216	502	4,795
Share of rented milk quota	%	30	24	-
Age of first calving	months	30	29	29

1) FCM = Fat Corrected Milk (4 %).
Data 1999.

Table A2.3: Growth strategies of the typical farms

		South	North	East
Baseline				
Constant number of cows		35	68	650
Use of free stable capacity				
No. of cows		45	80	1,000
			Using free stable capacities	
			Reduction of grain production for forage production	
			using more contract labour and hired labour	
Rearing young stock		yes	yes	yes
Other enterprises		no	35 beef bulls	no
Extending stable capacity				
No. of cows		60	120	1,500
Investments				
- Building new barn	Thousand €	184 *	87	1,023
- Milking installation	Thousand €	46	61	205
- other investments	Thousand €	82 **		
			more forage production	
			using more hired labour	
			using more contract labour	
Rearing young stock		Selling of young stock that isn´t needed for replacement		Building a young stock shed for 250 heifers (255.646 €)
Other			giving up beef bulls	

* Barn for 60 cows; Rebuild of stanchion barn to feeding places and young stock barn.

** Investment for bunker silo, slurry silo and feed mixer.

Table A2.4: TIPI-CAL-Assumptions

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Anmerkungen
Baseline												
Milk price	Index	100	105	108	104	104	104	96	93	89	89	Until 2001 as observed. Since 2005 GAPsi-results.
Quota purchase price [1)]	€/kg Quota	0.87	0.83	0.82	0.80	0.80	0.80	0.73	0.71	0.68	0.68	Quota purchase price until 2001 as observed. Since 2002 quota price connected to changes in milk price.
Quota rent price [1)]	€/kg Quota	0.08	0.08	———	———	———	constant	———	———	———	———	Until 2008 on the level of 2000, as with the introduction of the quota stock model in 2000 new rental contracts are not possible.
Beef price	Index	100	93	79	79	79	79	79	81	82	81	GAPsi-results. Assumption in 2001: beef market reform of the Agenda 2000 is anticipated due to BSE-crisis from 2002 to 2001
Milk premia, Grassland premia												
Milk price	Index	———	same as Baseline	———			48	46	45	43	40	GAPsi-results
Quota purchase price [1)]	€/kg Quota	———	same as Baseline	———		0.66	0.53	0.40	0.27	0.13	0.00	With announcement of quota exit (end of 2002) from 2003 linear drop to 0.
Quota rent price [1)]	€/kg Quota	———	———	———	same as Baseline		———	———	———	———	0.00	in the year 2008 abolishment of milk quotas
Beef price	Index	———	———	———	———	same as Baseline		———	———	———	———	