WIFO
ÖSTERREICHISCHES INSTITUT
FÜR WIRTSCHAFTSFORSCHUNG

WORKING PAPERS

Modelling Organic Farming at Sector Level

An Application to the Reformed CAP in Austria

Erwin Schmid, Franz Sinabell

288/2007

Modelling Organic Farming at Sector Level

An Application to the Reformed CAP in Austria

Erwin Schmid, Franz Sinabell

WIFO Working Papers, No. 288
February 2007

E-mail addresses: erwin.schmid@boku.ac.at, Franz.Sinabell@wifo.ac.at
2007/027/W/0

Modelling organic farming at sector level
– an application to the reformed CAP in Austria

Erwin Schmid and Franz Sinabell

Abstract

Organic farming practices have environmental benefits compared to conventional ones. Their adoption is the result of a complex interaction of intrinsic attitudes of farmers, their profit expectations and farm policy incentives. We use an agricultural sector model and develop an extended version of the Positive Mathematical Programming (PMP) method to differentiate organic farming from other management practices. Austria is chosen for the case study because 8 per cent of its farmland are managed organically, and detailed data on alternative management practices are available. The results suggest that the agricultural policy reforms made organic farming more attractive for farmers.

JEL Codes: Q11, Q18, Q21

Keywords: Organic farming; Common Agricultural Policy; Program for Rural Development, Agricultural sector modelling

---

Erwin Schmid
Department of Sustainable Economic Development
University of Natural Resources and
Applied Life Sciences, Vienna
Gregor Mendelstraße 33
A-1180 Wien
Austria

E-mail: erwin.schmid@boku.ac.at
Tel.: +43-1-47654-3653
Fax: +43-1-47654-3692

Franz Sinabell
WIFO Austrian Institute of Economic Research
P.O. Box 91
A-1103 Wien
Austria

E-mail: franz.sinabell@wifo.ac.at
Tel.: +43-1-7982601-481
Fax: +43-1-7989386
Web: http://franz.sinabell.wifo.ac.at

1. Introduction

Organic farming has considerable environmental benefits compared to conventional farming (see Mäder et al., 2002 for results on biodiversity and energy use and a recent by Afoeldi et al., 2002). The choice of farmers to switch to more environmentally friendly production systems is the result of a complex interaction of intrinsic motivations, environmental attitudes, the social context, and private cost-benefit assessments (Vogel, 1999).

Given that crop yields per hectare are lower, the promotion of organic farming is an instrument to reach two policy goals: to make agriculture more environmentally friendly and to reduce surplus production. Programs to stimulate organic production have been introduced in most EU member states as part of the accompanying measures of the CAP reform in 1992. In 2003, European governments (including those in Norway and Switzerland) spent more than EUR 500 million for the promotion of organic farming by offering premiums in the range of 100 to 250 EUR/ha (Stolze and Lampkin, 2005).

These subsidies and favourable market conditions have brought about a surge in organic farming in Europe. At EU-25 level, about 149 000 holdings are certified as organic and in-conversion farms which represent 1.4% of total agricultural holdings. Italy had the largest number of organic holdings (31% of EU-25 total) in ?2003?, followed by Austria, Spain and Germany. At EU-25 level, the certified organic and in-conversion area covered 5.7 million hectares and represented 3.6 % of the utilised agricultural area (UAA) in 2003. Italy had the most important organic area with more than 1.0 million hectares (about a fifth of EU-25), followed by Germany, Spain and United Kingdom and France (CEC, 2005).

The 2003 reform of the Common Agricultural Policy (CAP) changed the policy framework of farming significantly. Direct payments, previously linked to the production of certain crops or livestock, have been decoupled in 2005. Farmers are now supported by flat rate premiums per hectare or individual single farm payments, depending on the country specific implementation. Several studies have investigated the effects of this reform and shown that there are effects on farm incomes and farm outputs (FAPRI Ireland Partnership, 2003; OECD, 2004; LEI, IAP and IAM, 2003). Recent data show that in 13 of 17 EU member states for which data are available (Eurostat, 2006), the number of organic farms has increased from 2004 to 2005. Because other variables changed from 2004 to 2005 as well, it is not clear whether the reform contributed to this increase or not.

We make an attempt to evaluate to what extent the policy reform was responsible for that increase. According to our knowledge, only a few agricultural sector models differentiate conventional from organic production (Frandsen and Jacobsen, 1999 and Jacobsen , 2002). Jacobsen (2002) used an Applied General Equilibrium Model (AGE) to evaluate the consequences of different strategies to enhance the environmental effectiveness of farming practices. We propose an alternative approach, a modified version of the Positive Mathematical Programming (PMP) method.

PMP was initially developed by Howitt (1995) and since then extended and applied in many studies (e.g., Lee and Howitt, 1996; Paris and Arfini, 1995; Röhm and Dabbert, 2003). An advantage of this method over an AGE approach is that we are able to evaluate regional supply responses of agri-environmental programs in a very detailed manner. Austria is chosen as a case study, because a considerable share of agricultural land is used for organic farming, and a broad collection of farm management data has been made available for such an analysis.

The topic of the paper is to (i) present an extended PMP method to model organic farming when other agri-environmental programs are present, (ii) analyse how the 2003 CAP reform affects organic production in Austria, and (iii) what implications are to be expected from financial reallocations due to the new program for rural development, which will likely be implemented in 2007.

3. The method, data and model

3.1 An extension of the PMP method to model organic farming when other agri-environmental programs are present

The PMP method uses observed crop allocations and average production cost to derive parameters for non-linear cost functions (Howitt, 1995). Thus marginal cost can be derived from linear programming (LP) models. Given non-linear objective functions, regional PMP production models adjust smoothly and in a more realistic manner than LP models. Röhm and Dabbert (2003) proposed an extension of this method to integrate agri-environmental programs into regional models. In the standard PMP method the variants of say wheat production are treated like separate crops. Their reasoning is, that it is easier to switch from management practice A (standard production with growth regulator) to practice B (without growth regulator) when producing wheat than to switch between wheat and maize. We build on these approaches and extend the method of PMP in two directions:

- First, we think that agri-environmental practices should be differentiated in models, in particular if we consider organic farming. It is relatively easy to switch from wheat to maize production, either on organic or conventional farms. However, it takes much more efforts to switch the farming system from conventional to organic farming.
- Our second extension is related to problem of solving large scale models. The fact that a single crop can be produced by many farming practices (organic, conventional, etc.), and that each practice can have additionally several management measures (e.g. winter cover crops) will result in a large number of choice variables. We therefore use variable separation techniques to approximate the non-linear cost curves of the standard PMP method by piecewise linear functions (Schmid and Sinabell, 2005).

Suppose, the objective is to maximize producer surplus (PS) from the production of *i* crops, with *m* farming systems (e.g. conventional and organic farming systems) using *v* environmentally friendly management measures (winter cover crops, erosion control measures, etc.). Observed activity levels on crops, farming systems, and management measures ($b_{i,m,v}$) are separated into a set of activity grids ($b^{g}_{i,m,v,s}$) ranging, for instance, between 10 and 200 percent of the observed activity levels. The design of the activity grids can be such that the deviations are smaller around the observed levels and get larger the further they get away from these points. In this example, a variable enters the solution within the range of 10 to 200 percent of the observed level.

The set of exogenous parameters include indexed prices ($\rho_{i,m}$), outputs ($o_{i,m,v,s}$), approximated production cost shares ($\chi_{i,m,v,s}$), Leontief production technologies ($\mathrm{A}_{i,m,v}$), and a land resource endowment ($b_{i,m,v}$). The choice on crop, farming system, and management measure shares is obtained by building convex combinations ($\theta_{i,m,v,s}$) among the set of activity grids ($b^{g}_{i,m,v,s}$). The model is calibrated to observed activity levels ($b_{i,m,v}$) using the extended PMP method of variant production technologies developed by (Röhm and Dabbert, 2003).

$$\max_{\theta} PS = \sum_{i,m,v,s} \left[\left(\rho_{i,m}\, o_{i,m,v,s} - \chi_{i,m,v,s} \right) \theta_{i,m,v,s} \right] \tag{1}$$

$$\text{s.t.} \quad \sum_{i,m,v,s} \left(\mathrm{A}_{i,m,v}\, b^{g}_{i,m,v,s}\, \theta_{i,m,v,s} \right) \leq \sum_{i,m,v} \left(b_{i,m,v} \right) \tag{2}$$

$$\sum_{s} \left(\theta_{i,m,v,s} \right) = 1 \qquad \text{for all i, m and v} \tag{3}$$

$$0 \leq \theta_{i,m,v,s} \leq 1 \tag{4}$$

where $\chi_{i,m,v,s} = \int_0^{b^g_{i,m,v,s}} \left(\alpha_{i,m,v} + 2\beta_{i,m,v} b^g_{i,m,v,s} + 2\varphi_{i,m,v} \sum_v \left(b^g_{i,m,v,s} \right) \right) db^g_{i,m,v,s}$ are approximated multi-variant production cost shares of quadratic shape. The coefficients of a linearly increasing multi-variant marginal cost curve are $\alpha_{i,m,v}$, $\beta_{i,m,v}$, and $\varphi_{i,m,v}$. The intercept coefficients of the indexed linear multi-variant cost curve are

$$\alpha_{i,m,v} = 1 - \frac{\left(\lambda_{i,m} + \lambda_{i,m,v} \right)}{VC_{i,m,v}}, \tag{5}$$

the slope coefficients of variant activity levels are

$$\beta_{i,m,v} = \frac{\lambda_{i,m,v}}{VC_{i,m,v}\, b_{i,m,v}}, \text{ and} \tag{6}$$

the slope coefficients of crop activity levels are

$$\varphi_{i,m,v} = \frac{\lambda_{i,m,v}}{VC_{i,m,v} \sum_v b_{i,m,v}}. \tag{7}$$

The λ are modified duals of the perturbed model. The variable costs (VC) of production activities are from the Austrian standard gross margin catalogue (BMLFUW, 2002).

By definition, the area beneath a linear marginal cost curve is the *variable* cost of production as expressed in $\chi_{i,m,v,s}$, or a point on the associated quadratic cost curve. The convexity and identity condition in equation (3) allows any convex combination in the set of activity grids ($b^g_{i,m,v,s}$). The optimal crop, production system, and management measure shares in hectares are finally computed by $b^g_{i,m,v,s}\theta^*_{i,m,v,s}$. Similarly, total production output is the sum of $o_{i,m,v,s}\theta^*_{i,m,v,s}$, total revenue is the sum of $\rho_{i,m} o_{i,m,v,s}\theta^*_{i,m,v,s}$, and total production cost are the sum of $\chi_{i,m,v,s}\theta^*_{i,m,v,s}$.

It is important to note that environmentally friendly management measures are separately available for conventional and organic farming systems. This modified multi-variant production cost approach allows for an easier change between management variants (e.g. winter cover crops) than between crops and farming systems. These substitution schedules have considerable consequences in regional and sectoral modelling especially, when agronomic considerations, different farming systems, and agri-environmental policies play an important role in the decision process of farmers.

3.1 The Positive Agricultural Sector Model Austria - PASMA

The Positive Agricultural Sector Model Austria (PASMA) is employed to estimate the impact of farm policy measures on the supply of organic farming in Austria. PASMA depicts the political, natural, and structural complexity of Austrian farming in detail and was used for a number of policy evaluation studies (e.g. Schmid et al., 2007). Data from the Integrated Administration and Control System (IACS), Economic Agricultural Account (EAA), Agricultural Structural Census (ASC), Farm Accountancy Data Network (FADN), the Standard Gross Margin Catalogue (BMLFUW, 2002), and the Standard Farm Labour Estimates (Greimel et al. 2003) provide necessary information on resource and production endowments for 40 regional and structural (i.e. alpine farming zones) production units in Austria. Consequently, PASMA is capable to estimate production, labour, income, and environmental responses for each single unit.

Apart from the model features described in the previous section, PASMA uses convex combinations of crop and feed mixes, expansion, reduction and conversion of livestock stands, and a transport matrix. Imports of feed and livestock are included to allow reasonable responses in production under various policy scenarios. Conventional and organic production systems (crop and livestock) have separate feed and fertilizer balances at regional and structural scales. Transfers between these two production systems are not allowed in the model, however, they compete for the same resources (i.e. land).

The support program for farms in less-favoured areas (LFA) and the agri-environmental program are explicitly modelled with area payments that are stratified by regional and structural units. Thus the two most important components of the program for rural development (with a volume equivalent to 38 % of Austrian farm sector income in 2004) are modelled measure by measure. Product prices and other model assumptions are referenced in Schmid and Sinabell (2003). Most prices are exogenously given and based on OECD (2004 and 2005). Prices for organic products are based on Eder et al. (2002), and Freyer et al. (2001).

4. Policy reform, scenarios, and results

4.1 The reform of the Common Agricultural Policy

The objectives of the 2003 CAP reform are economic (increased competitiveness, stronger market orientation, and more efficient income support), social (more responsiveness to consumer demands, encouragement to improve food quality and safety), and environmental goals (development of environmental and animal welfare standards). In order to achieve these goals, the following measures were agreed upon in 2003 to:

- modify market regimes (reduction of administrative prices, special regulations for protein crops and durum wheat, prolongation of the milk quota system until 2014/15),
- the introduction of a single farm payment (direct payments will be decoupled from farm outputs), and
- introduce several accompanying measures (e.g. degression, modulation, enhancement of consumer trust, additional environmental and animal welfare standards).

Member states have got the freedom to fine tune CAP-instruments according to their specific policy goals. They may choose to introduce the single farm payment in full or they may opt to retain part of the premiums coupled to the output (this option was chosen in Austria). The funds saved by modulation will be used to reinforce the program for rural development. Via this new instruments, funds can be re-allocated among Member States (Austria will be among the beneficiaries).

4.2 The model scenarios

The **first scenario** analysed in this paper is a comparison between the situation in 2003 (with the Agenda 2000 in place) and the reformed CAP in 2008, when the introduction of a single farm payment will be fully implemented. In this scenario we analyse whether we can expect a stimulation or a weakening of organic farming after the recent CAP reform at national scales.

The **second scenario** is a comparison between a base-line towards 2008 with the Agenda 2000 in place and the reformed CAP in 2008. In the Agenda 2000 situation (no decoupling) a different set of prices is used (based on OECD, 2004) and direct payments are linked to outputs.

In **both scenarios**, we assume that the budget for agri-environmental measures will be reduced by about 10 per cent to allow some redistribution to other measures in the new program for rural development, to be introduced in 2007. Funds saved by the reduction of the volume of agri-environmental payments are assumed to remain in the farm sector (modelled as lump sum transfers).

In Austria, the premiums for suckler cows will remain coupled to production by 100 % and the slaughter premiums by 40 per cent. All other premiums apart from rural development payments will be decoupled. A moderate (exogenous) rate of technical progress and constant real input prices are further assumptions. We do not adopt exogenously given labour declines in order to isolate the policy effect on structural adjustment. As required by regulations, decoupled premiums must be matched by eligible hectares and land must be maintained in good agricultural and ecological condition. Thus, afforestation is effectively prevented unless maintenance costs of agricultural land exceed decoupled premiums. Per hectare premiums for organic farming are at the same nominal levels as in 2000, and other conditions (e.g. animal welfare requirements and restrictions on feed components) do not change between the scenarios, either.

4.3 Model results

The model results reported in Table 1 show a comparison between the (modelled) situation in the 2003 and outcomes in 2008 when the CAP reform is fully implemented. A comparison between the base-line of the Agenda 2000 scenario in 2008 and the situation after the 2003 CAP reform is provided in the right column.

Economic consequences

- Farm welfare (producer surplus of agricultural activities including direct payments and other subsidies) is likely to increase at national level in nominal terms when the situation in 2003 is compared to 2008 (first scenario).
- It is assumed that premiums for organic farming will not change in the new program for rural development. But the total volume of payments will expand by 2.2 % (compared to 2003) or 1.2 % (compared to Agenda 2000 in 2008) because more farmland is brought into the program.

Consequences for farm labour

- After the 2003 CAP reform, the demand for farm labour will be lower by 1 %.
- Organic farming is more labour intensive, thus the decline of farm labour due to the CAP reform is cushioned.

Consequences for land use and crop production

- Total arable land will decline after the CAP 2003 reform, in particular conventional arable land. The acreage of organically managed arable land will be affected to a lesser extent.
- The conditions of the single farm payments guarantee that farm land is not turned into forest. Therefore the decline of arable land is mirrored by an increase of grassland, which is more extensively managed.
- The production of conventionally produced crops will almost evenly decline across all products. The results are mixed as far as organic crop production and protein crops are concerned.

TABLE 1

Consequences for livestock production

- Non-beef meat production will expand after the 2003 CAP reform. This is particularly true for organic pork production.
- We expect a larger herd of suckler cows and heifers after the reform and relative to Agenda 2000 because premiums remain coupled to production in Austria. Fewer bulls will be fattened, because bull premiums will no longer be linked to production.

5. Discussion and conclusions

We have analysed how output of organic farms might respond to changes after the 2003 CAP reform. Our model results capture the Austrian agricultural sector for which detailed farm data are available. The results suggest that organic farming will become more attractive to farmers after the 2003 CAP reform if the specific support remains. The observed increase of the acreage managed according to organic farming criteria between 2003 and 2005 can therefore be partly explained by the policy reform.

Organic farms are also affected by the abolition of production linked premiums. However, we expect that production adjustments are slightly different in organic farms than in conventional farms. The overall reform effect is that organic output declines to a lesser extent than conventional output. Thus, the 2003 CAP reform is likely to reach two goals, namely the reduction of outputs while simultaneously making farming less input intensive.

Our results are contingent upon the assumption that historically observed margins between conventional and organic crop and livestock outputs will be paid in future. This assumption seems to be justified by two reasons: (i) An Austrian and an EU action program for organic farming strive to boost demand for organic products. If demand effects materialize then we expect prices around current levels. (ii) Organic products are free of GMOs. Thus consumers get an additional attribute *for free* when they buy organic food. This is likely to stimulate demand among consumers concerned about GMO food. However, at the current state we cannot base our reasoning on model results, because demands for organic foods are not explicitly included yet. Therefore, in future efforts will be necessary to account for consumer choices and feedbacks from the market within the modelling approach we have developed.

Sources

Alfoeldi, Th., A. Fliessbach, U. Geier, L. Kilcher, U. Niggli, L. Pfiffner, M. Stolze, and H. Willer, 2002, Organic Agriculture and the Environment, in El-Hage Scialabba, Nadia and Caroline, Hattam, Eds. Organic agriculture, environment and food security, chapter 2. Environment and Natural Resources Series 4. Food and Agriculture Organisation of the United Nation (FAO), Rome

BMLFUW (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft), *Standarddeckungsbeiträge und Daten für die Betriebsberatung* 2002/03, Selbstverlag, Wien (2002).

CEC (Commission of the European Communities; Direction G. Analyses économiques et évaluation), Organic Farming in the European Union – Facts and Figures, G2 EW - JK D(2005), Bruxelles, 3 Novembre 2005.

Eder, M., R. Dalmolin, and G. Altrichter, *Standarddeckungsbeiträge und Daten für die Betriebsberatung im Biologischen Landbau* 2002/2003, BMLFUW, Wien (2002).

Eurostat, Organic Farming in Europe, A sustained growth over the period 1998-2000, *Statistics in focus*, Environment and Energy, Theme 8, 2/2003, Luxembourg (2003).

Eurostat, Number of registered organic farm operators at the end of the year, New Cronos, Last update: Tue Dec 19 14:05:47 MET 2006.

FAPRI-Ireland-Partnership, The Luxembourg CAP Reform Agreement, Analysis of the Impact on EU and Irish Agriculture, Teagasc Rural Economy Research Centre, October 14th, Dublin (2003).

Frandsen S.E., and L.B. Jacobsen, Analyser af de samfundsøkonomiske konsekvenser af en omlægning dansk landbrug til økologisk produktion (Report on the Economy-Wide Effects of a complete change of Danish Agriculture into Organic Farming), Danish Research Institute of Food Economics, SJFI working paper no. 5 (1999).

Freyer, B., M. Eder, W. Schneeberger, I. Darnhofer, L. Kirner, T. Lindenthal, and W. Zollitsch, Der biologische Landbau in Österreich – Entwicklungen und Perspektiven, *Agrarwirtschaft* 50 (7) (2001), 400-409.

Greimel, M., F. Handler, M. Stadler, and E. Blumauer, Methode zur Ermittlung des einzelbetrieblichen und gesamtösterreichischen Arbeitszeitbedarfes in der Landwirtschaft, *Die Bodenkultur* 54 (2) (2003).

Howitt, R.E., Positive Mathematical Programming, *American Journal of Agricultural Economics* 77 (1995), 329-342.

Jacobsen, L.B., Does organic farming achieve environmental goals efficiently?, Beitrag präsentiert bei der Konferenz: OECD Workshop on Organic Agriculture, Washington D.C., USA, 23-26 September (2002).

Lee, D.J., and R.E. Howitt, Modelling Regional Agricultural Production and Salinity Control Alternatives for Water Quality Policy Analysis, *American Journal of Agricultural Economics*, 78 (1996), 41-53.

LEI, IAP and IAM, Development of models and tools for assessing the environmental impact of agricultural policies, Final report (ENV.B.2/ETU/2000/073), The Hague, April 27th (2003).

OECD (Organisation for Economic Co-operation and Development), *OECD-FAO Agricultural Outlook* 2005-2014, Paris (2005).

OECD (Organisation for Economic Co-operation and Development), Analysis of the 2003 CAP reform, Paris (2004).

Paris, Q., and F. Arfini, A Positive Mathematical Programming Model for the Analysis of Regional Agricultural Policies, Proceedings of the 40th Seminar of the European Association of Agricultural Economists, Ancona (1995).

Röhm, O., and S. Dabbert, Integrating Agri-Environmental Programs into Regional Production Models: An Extension of Positive Mathematical Programming, *American Journal of Agricultural Economics* 85 (2003), 254-265.

Schmid, E. and F. Sinabell, The Reform of the Common Agricultural Policy: Effects on Farm Labour Demand in Austria. Working paper, Nr. 101 W-2003, Department of Economics, Politics and Law, University of Natural Resources and Applied Life Sciences, Vienna (2003).

Schmid, E. and F. Sinabell, Using the Positive Mathematical Programming Method to Calibrate Linear Programming Models, Discussion paper, Nr. dp-10-2005, Institute for Sustainable Economic Development, University of Natural Resources and Applied Life Sciences, Vienna (2005).

Schmid, E., F. Sinabell und M.F. Hofreither, Phasing out of Environmentally Harmful Subsidies: Consequences of the 2003 CAP Reform, Ecological Economics, 60 (2007) 596-604.

Vogel, St., 1999, Umweltbewußtsein und Landwirtschaft - Theoretische Überlegungen und empirische Befunde (Environmental awareness and agriculture – theoretical reflections and empirical findings). Kommunikation und Beratung - Sozialwissenschaftliche Schriften zur Landnutzung und ländliche Entwicklung, Bd. 34, 142 S., Weikersheim: Margraf Verlag.

Table 1: Percentage change of economic, land use, and production indicators in 2008 compared to AGENDA 2000 in 2003 and 2008

	unit	level 2003	% change of CAP reform versus Agenda 2000 scenario	
			baseline 2003	baseline 2008
economic indicators				
farm welfare[1)]	bn EUR	3.78	+ 0.7	– 1.4
volume of agri-environmental program [2)]	mn EUR	628	– 10.6	– 10.5
organic farming premiums	mn EUR	86	+ 2.2	+ 1.2
farm labour input	1,000 AWU	172	– 1.0	– 0.1
land use				
arable land	1,000 ha	1,380	– 3.5	– 1.5
– conventional	1,000 ha	1,260	– 3.7	– 1.5
– organic	1,000 ha	120	+ 0.1	– 1.0
grassland (without alpine grassland)	1,000 ha	1,101	+ 4.6	+ 3.7
crop production conventional (acreage)				
– cereals (without maize)	1,000 ha	561	– 3.8	– 1.3
– protein crops	1,000 ha	36	– 4.4	+ 1.2
– oilseeds	1,000 ha	106	– 4.6	– 3.3
crop production organic (acreage)				
– cereals (without maize)	1,000 ha	52	+ 1.8	– 0.5
– protein crops	1,000 ha	11	+ 7.9	+ 1.1
– oilseeds	1,000 ha	2	– 0.4	– 1.1
heads of conventional livestock				
cattle	1,000 heads	1,733	+ 1.4	+ 0.5
male cattle	1,000 heads	480	– 2.5	– 5.5
female cattle	1,000 heads	1,253	+ 2.3	+ 1.9
pigs	1,000 heads	3,209	+ 0.3	+ 0.3
heads of organic livestock				
cattle	1,000 heads	319	+ 1.0	+ 0.9
male cattle	1,000 heads	42	– 2.1	– 3.2
female cattle	1,000 heads	277	+ 1.4	+ 1.5
pigs	1,000 heads	36	+ 4.1	+ 3.4

Source: Own calculations based on price forecasts of OECD (2004). Note: 50 000 additional suckler cow premium entitlements are shared among owners of heifers. Additional funds for the program for rural development (EUR 17 million annually from modulation) are not accounted for in total transfers.

[1)] Farm welfare is producer surplus from agricultural activities including single farm payments and other program payments. [2)] The assumption is made that the volume of Axis-2 measures is reduced by 10% in 2007 while premiums per hectare for organic farming remain at 2003 levels.

© 2007 Österreichisches Institut für Wirtschaftsforschung

Medieninhaber (Verleger), Hersteller: Österreichisches Institut für Wirtschaftsforschung • Wien 3, Arsenal, Objekt 20 • A-1103 Wien, Postfach 91 • Tel. (43 1) 798 26 01-0 • Fax (43 1) 798 93 86 • http://www.wifo.ac.at/ • Verlags- und Herstellungsort: Wien

Die Working Papers geben nicht notwendigerweise die Meinung des WIFO wieder

Kostenloser Download:
http://publikationen.wifo.ac.at/pls/wifosite/wifosite.wifo_search.get_abstract_type?p_language=1&pubid=28278