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**MODELOVÁNÍ DOPADŮ ZEMĚDĚLSKÉ POLITIKY ČR
PO ROCE 2013**

**MODELLING OF IMPACTS OF CZECH AGRICULTURAL
POLICY AFTER 2013**

(Výzkumná studie)

Praha, 2012

EXECUTIVE SUMMARY

This study deals with description and using of modeling tools for simulations and predictions of impacts of the probably directions of the CAP after the year 2013 on the Czech agriculture. The modeling tool consists of the three models: FARMA-4, RENT-4 and AENVI-2. The model FARMA-4 is a model of farm economics, RENT-4 is a model of profitability of agricultural commodities in the Czech Republic (25 plant and 12 animal commodities) and AENVI-2 is a model of production functions and agro-environmental aspects of these commodities. In the study there are presented the latest research results which are connected with the mentioned models and there are shown possibilities and advantages of their usage like the model systems for analyzing relations of the future CAP, agricultural sustainability and positive and negative impacts on the Czech environment. The chosen commodities cover about 98 % of the Czech agricultural production. All models are based on the common database BASELINE UZEI which contains time series of the Czech agricultural indicators from the year 1995 till the present (from the CZSO, FADN CZ and the COST inquiry of Czech farms). Further there was created a database POLICY containing agrarian-policy analysis of the probable future trends of the CAP after the year 2013 which are focused in the 3 scenarios (basic, liberal and environmental).

Development of modeling of economic and ecological aspect of the farm behavior with the help of the model FARMA-4 is connected with the progress of the modeling apparatus for predictions of production economic indicators (model RENT-4) and with dividing and using production functions for impact simulations of intensive and extensive farming on the environment (model AENVI-2).

The connecting of the model FARMA-4 with the model RENT-4 enables fill-in the model FARMA-4 by input data for modeling farm economics in the different production conditions in the CR. On the base of the average production structure in 4 production regions (corn-sugar beet, potatoes, potatoes-oats, mountain and the CR average), which are taken over from the FADN CZ inquiry, there are created type farms of these regions in transformation on the 100 ha farm land. Basic input data of the type farms: the production intensity (hectare yields and animal intensity indicators), the total costs (resp. reduced costs), market prices and supports (the others, e.g. number of hours needed for individual commodities) are taken from the model RENT-4 related to the corresponding time horizon which come out from the COST inquiry.

The main variables of the model FARMA-4 are land size of the plant commodities (market and feeding), head numbers of individual animal categories (dairy cattle, suckler cattle, pigs and poultry) whose optimal values are computed from the model by the optimization procedure (maximizing of profit, resp. net value added) in the system GAMS. The model pictures relations between plant and animal production by the help of the feeding balance, going out from the feeding needs of individual animal categories and the production of feeding stuffs. The model needs following input parameters

- biological-technological parameters: hectare yields, animal intensity, feeding nutrients;
- economic parameters: cost of commodities, market prices or realizing prices;
- agrarian-policy parameters: all types of supports which can be allocated to commodities (SAPS, Top-Up, LFA supports, agro-environmental payments and further supports, like "green diesel";
- further input parameters: norms of hour consumptions for commodities, balance of N, P, K.

The model FARMA-4 enables computation of farm profit, farm NVA, number of AWU, profit or NVA for AWU etc.

The next progress in this direction there was creation of the model AENVI-2 which contains dynamic dependence of intensity level on the input cost level by the commodity production functions. Production functions were divided from the COST inquiry with the cooperation of the Research Institute of Plant Production. There were created balance relations for the Nitrogen input from the mineral and organic fertilizers (incl. air deposition) into plants, using N by plants and its possible out-flow in the environment.

The models FARMA-4, RENT-4 and AENVI-2 thus present a model system which is usable for the central sphere and enables to carry out simulations agricultural policy impacts on the Czech agriculture.

The model AENVI-2 was actualized from the theoretic-methodological point of view for all 37 commodities of the COST inquiry and the consequence is that all three models have the same database.

After connection of the models RENT-4 and AENVI-2 there were computed new predictions of production and cost indicators and profitability till the year 2014 for all commodities. The year 2014 presents the period 2014-20 for which there is presented the new CAP.

In the last part of the study there is described methodology of feeding norms for cattle and pigs for the model FARMA-4 on the base of the optimizing system of AgroKonzulta Žamberk.

The usage of production functions enables to analyze different intensity levels of individual commodities and consequently to assess their negative and positive impacts on environment. This situation is illustrated in the annex 1, which contains predictions of profitability till 2014 - results of the model AENVI-2 with the different intensity of inputs (70 %, 80 %, 90 %, 100 % and 110 %) in comparing with the average intensity in the model RENT-4 (corresponding to 100 % level in the model AENVI-2). These results also indicate that not always and not for all commodities it holds that the average farming is economic optimal.