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The influence of producer prices on livestock production development in Croatia

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ABSTRACT

An aggregate indicator of the influence of producer prices on the whole of agricultural production in the Republic of Croatia for the period 1981-1997 shows that the prices of agricultural products did not determine the level of production in great measure. The coefficient of determination shows that only 41% of the change in agricultural production can be explained by changes in producer prices, and 59% by the influence of other factors. It is well known that a more significant influence on changes in some production levels is exerted by producer prices from the previous year or years. Shifted by one year, the influence of producer prices on production (the price in year X in relation with production in year X+1) is much more significant, so the coefficient of correlation for the period analysed is R=0.75 and the coefficient of determination is 0.55. The higher the producer price for the next year or period, the higher the level and quality of agricultural inputs consumed. This research shows that in the production of basic livestock products there exists no substantial relation between producer prices and changes in production level.
(Keywords: agricultural production, livestock production, producer prices)

ZUSAMMENFASSUNG

Einfluss der Produzentenpreise
auf die Erzeugung tierischer Produkte in Kroatien

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Der gemeinsame Indikator des Einflusses der Produzentenpreise auf die gesamte landwirtschaftliche Produktion in der Republik Kroatien für den Zeitraum von 1981 bis 1997 zeigt, daß die Preise für landwirtschaftliche Produkte das Produktionsniveau nicht wesentlich beeinflusst haben. Der Determinierungskoeffizient zeigt uns, daß nur 41% der Änderungen der landwirtschaftlichen Produktion durch Produktionsänderungen erklärt werden können und 59% durch andere Faktoren. Es ist bekannt, daß die Produzentenpreise aus dem Vorjahr einen bedeutenden Einfluß auf die Änderungen in einigen Produktionsbereichen haben. Den Einfluß der Produktionspreise auf die Produktion (um ein Jahr) zu verschieben (der Preis im Jahre X im Verhältnis zu der Produktion im Jahre X+1) ist viel aufschlussreicher, da der Korrelationskoeffizient für den analysierten Zeitraum r^2=0,75 beträgt, der Determinierungskoeffizient 0,55. Ein höherer

Produktionspreis im Folgejahr bedeutet ein höheres Niveau und eine bessere Qualität der verwendeten landwirtschaftlichen Aufwendungen. Unsere Untersuchung zeigt, daß bei der Produktion der dominierenden Tierprodukte keine bedeutende Verbindung zwischen den Produzentenpreisen und den Änderungen im Produktionsbereich besteht.
(Schlüsselwörter: Landwirtschaftliche Produktion, Tierproduktion, Produktionspreise)

INTRODUCTION

The producer prices of agricultural products influence the production level to a more or less intensive degree. The intensity of this relation is most often determined by a biological cycle of individual production, and this analysis has shown either stronger or weaker influence of producer prices on the level of agricultural production during the period analysed. There are considerable differences between individual products due to the duration of the production cycle.

The familiar problems caused by the situation in agriculture as a whole as well as in livestock production adversely affected the changes in livestock production. In the years analysed, although there were some attempts by the state to stimulate development in livestock production (by means of subsidies and premiums), the lack of other measures, together with uncontrolled imports which have often been on the verge of the illegal import of goods of dubious quality, posed an obstacle to more comprehensive changes. The quantity of livestock destroyed, particularly in the cattle and pig breeding sectors, led to an increase in producer prices for beef cattle, and producer prices consequently increased for almost all categories of beef cattle.

The changes in livestock production were also caused by a number of non-economic factors: change in the social-economic system, dissolution of the market of the former state, war damage, bans and lack of export possibilities for some types of livestock and meat, problems related to the transformation of former state-owned companies (agricultural complexes), and the like.

METHODOLOGY AND DATA SOURCES

The trends in production and producer prices were determined by the application of trend methods (rectilinear and curvilinear), where the trend applied was the best illustration of a change during the period analysed.

Regression and correlation analyses were used to determine interrelation between production and price. To that end, a model of the following general form was used:

$$PM=f(ČPM)\ Č=1,2,3,\ ...,\ N$$

The producer prices are the buying off prices established by the agricultural producers, which do not include the state and/or processor subsidies. Because of changes in local currency and inflation, all prices in the calculations are expressed in German Marks (medium exchange rate of the Privredna Banka Bank in Zagreb). The data on livestock production were obtained from the State Bureau of Statistics of the Republic of Croatia.

RESULTS AND DISCUSSION

Production of major livestock products in Croatia (period 1981-1997)

Meat cattle production

Since 1981 meat cattle production has constantly been on the decrease. The difficult economic situation in Croatian agriculture has been reflected most strongly in meat cattle

production. The highest decrease has been recorded since 1992, and the negative trend has not yet stopped. Taking into consideration the duration of the reproductive cycle in cattle breeding, recovery in production and the attainment of the pre-war level will demand considerable investment for a lengthy period of time. It is particularly alarming that the disappearance of meat cattle production on large, formerly state-owned farms was not followed by an adequate increase in family farm production. Recovery in this production will be an indicator of increase in total production in the Republic of Croatia (due to the comparatively large proportion of this production in total agricultural production).

In 1981 meat cattle production was 150,000 tonnes, to drop by 1997 to less than half (61,780 tonnes). The average for the entire period was 54,238 tonnes.

Meat pig production

Pig breeding production is closely related to corn production and the general standard of living. The pig supply sector is dominated by small producers (1-5 sows) accounting for 75% of production. Large-scale producers, which hold more interest for the market, make up only 30% of production. Family farms must increase their productivity in pig breeding and maintain high quality. Pork consumption requirements have not been adequately met. However, the prominent position in this production sector will be occupied by quality products. Pork has the highest share in consumption, so state interest in supporting loans for production is obvious.

Pork production during the period in question indicates a reduction from 266,000 tonnes in 1981 to 162,702 tonnes of pig meat produced in 1997. The average production for the entire period was 165,994 tonnes per year.

Meat poultry production

Poultry (i.e., fowl) meat production and consumption (particularly that of hens, i.e. broilers) depends mostly on changes in beef/pork prices and changes in the general standard of living.

Poultry meat production has made the greatest progress, and its share in total meat consumption is increasing constantly. This has been achieved by good results of selection based on the following characteristics: animal feed conversion, daily weight gain, and a shorter fattening period.

By the end of the eighties meat poultry production was on the increase, followed by a period of stagnation and finally a considerable decrease.

The greatest decrease recorded after 1990 was that which occurred in 1995, when production fell to the level of the end of the previous decade. In 1996 and 1997 a slight increase in production was observed. In 1997 meat poultry production was about 7,000 tonnes.

Cow's milk

The production of (milked) cow's milk showed a decrease from 1,020 million litres in 1981 to 576 million litres in 1997.

Milk production is affected by numerous adverse factors, along with the human factor reflected in demand for cost-effectiveness, or rather for a high production rate. To achieve an adequate production rate and work efficiency, and to provide an environment suitable for both humans and cattle, high investment in cattle, structures and equipment is necessary. High investment in basic production resources, labour and fodder may be justified only if the milk production per head is high. High milk production demands quality fodder, intensive feeding and an adequate meal structure. The average annual production for the period analysed was about 603 million litres.

Hen's eggs

The fastest growth within the sector of agricultural, particularly livestock production was realised in poultry production. The application of scientific results and the development of technology have increasingly reduced the dependency on natural conditions of this field of production. The results attained in meat and egg production have demonstrated an exponential increase.

Production of consumer hen's eggs shows no significant annual fluctuations. The level of this was recently somewhat above 800 million eggs per year.

This production is significantly affected by the unregulated import regime.

Egg production in Croatia is concentrated on large farms and family farms. The large farms have introduced industrial production technologies which enable continuous production throughout the year. The small family farms still have low external input production. The family farms usually have several dozen hens which start laying eggs in February and stop mid-year, while during the rest of the year production is negligible. The low and variable laying rate is affected by the low genetic potential of domestic breeds, insufficient feeding and inadequate keeping systems. During the period of the higher laying rate the surplus production is offered on the market. During this period production considerably exceeds demand, it is difficult to sell eggs on the market and prices drop. For the rest of the year the situation is the opposite. Therefore fluctuations in egg production have a considerable impact on the egg market. The egg supply is not uniform throughout the year, and the price is high from September to January, which affects demand in that period.

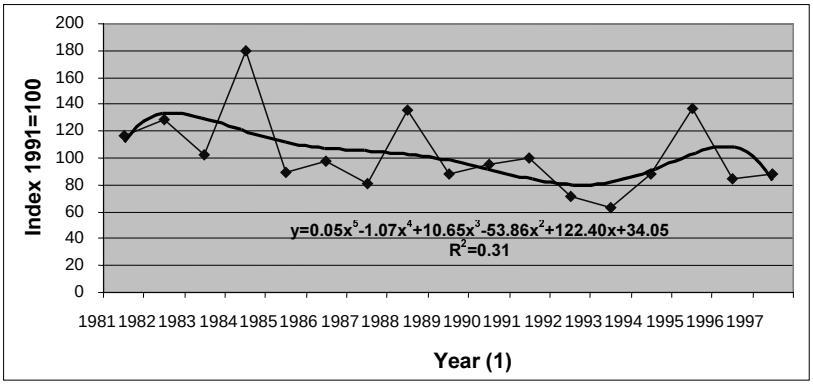
Change in producer prices and their influence on production of major livestock products

Meat cattle production

Producer prices in cattle breeding, particularly in meat cattle production, are influenced significantly by the market, along with state foreign trade policy (import/export regime, domestic production protection against illegal or uncontrolled import, export incentives and the like). Recently beef production was generally governed by foreign trade measures and a considerable change in price was observed during the period studied.

Fig. 1

Changes in producer prices for meat cattle in Croatia



1. Abbildung : Veränderungen der Produzentenpreise für Rindern in Kroatien

Jahre(1)

The lowest producer price for the buying off of cattle (live weight) was recorded in 1993, when Croatian export into the traditional European markets was obstructed (due to alleged foot-and-mouth disease). The subsequent price increase lasted until 1995, to drop subsequently to 3.5 DEM/kg live weight.

During the period analysed the annual changes in producer prices in cattle production were significant; the producers' reaction to price changes was slower because of the longer biological production cycle (coefficient of determination 0.14). The greatest proportion of meat cattle production is achieved by those producers who, on average, have a small number of cattle per farm. At the same time, the former state-owned sector, which had been a large producer of beef, has been almost eliminated, so the current low level of production is not capable of fast reaction to changes in producer prices.

Meat pig production

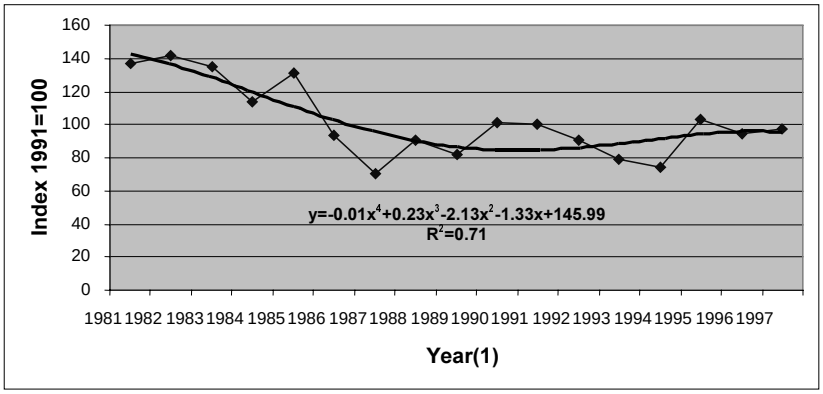
Producer prices for pigs are most affected by changes in the corn market. The known pork production cycles are also applicable in Croatia.

Pork prices take shape on the market, based on the effects of supply and demand. An unregulated pig market, such as that in Croatia, displays a constant imbalance in pork supply and demand caused by the pig cycles. The most important influence on the pig supply is not that of absolute pig price but rather that of the relation between the price of pig per kg and the price of 1 kg fodder, in this case corn.

As already stated, producer prices for pigs reveal the classic, predictable pattern of change. The first cycle during the period analysed was up to 1987 and the second from 1987 to 1994, while the third is the current period of increase in producer prices. The highest producer prices were recorded at the beginning of the period analysed (over 4 DEM/kg live weight), and they have since decreased to stabilise at about 3 DEM/kg during the past few years.

Fig. 2

Changes in producer prices for pigs in Croatia



2. Abbildung: Veränderungen der Produzentenpreise für Schweine in Kroatien

Jahre(1)

As compared to meat cattle production, producer prices in pig production have somewhat more significant influence on the level of production (R=0.40). The influence of producer

prices on production level shifted by one year is also low (R=0.46), which might be explained by the following facts.

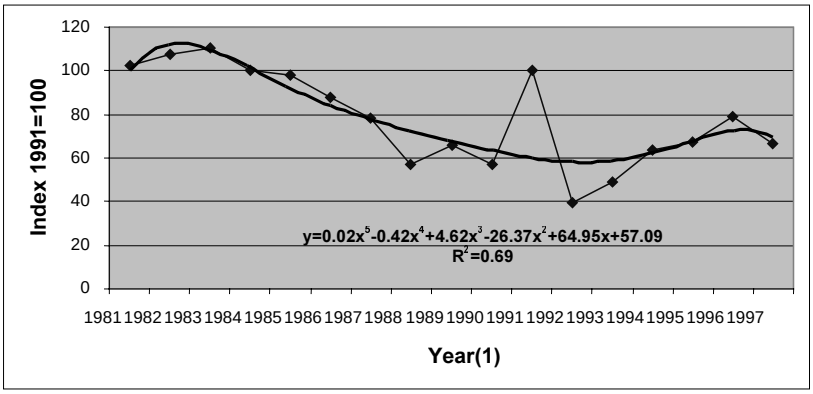
- Pig production is closely correlated with corn production and changes in producer prices of corn (known as 'pig' cycles).
- A comparatively high proportion of pig trade is carried out among peasant farmers, and statistics for a considerable proportion of trade and pig prices remain unrecorded at the end of the year.
- A considerable share of the total quantity of pig meat produced is accounted for by natural production and selling on the family farms.

Meat poultry production

Until 1990 poultry producer prices (particularly those for fattened chickens, i.e. broilers) had been showing a decreasing trend. In that period, when the signs of economic crisis were becoming obvious, poultry meat was a substitute for other kinds of meat, particularly beef. The system of protection of the general standard of living was partly based on chicken meat prices because during that period the majority of market surpluses were generated by large state-owned farms. At the same time, the number of both state-owned and private farms suddenly increased, and industrial production technology was predominant.

Fig. 3

Changes in producer prices for poultry in Croatia



3. Abbildung: Veränderungen der Produzentenpreise für Geflügel in Kroatien

Jahre(1)

A large increase in producer prices for poultry meat was recorded in 1991 (at the beginning of the war), but even as early as 1992 prices dropped to approximately 1.5 DEM/kg live weight. Prices subsequently increased with a slight drop in 1997.

The producer price of meat poultry for the period 1981-1997 did not significantly influence the changes in production. The coefficient of determination shows that change in production of only 8% may be explained by changes in producer prices, and change of 25% by the effect of price from the previous year. The other influential factors include the following.

- In the pre-war period poultry meat consumption was on the decrease and the consumption of other, higher quality kinds of meat on the increase.

- Total poultry meat production was based on the production of family farms with low average numbers of poultry.
- A significant part of production was intended for natural consumption with a high proportion of unregistered trade.

Hen's eggs

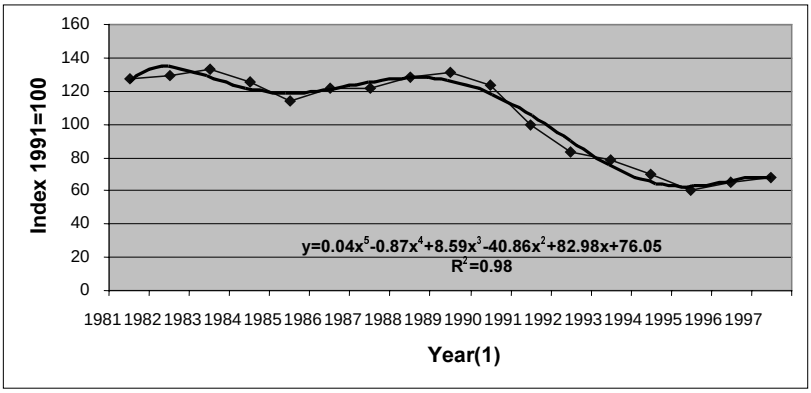
Producer prices for consumer hen's eggs are mostly determined by supply and demand and, recently, by the effects of the unregulated and often legally dubious system of foreign trade exchange in Croatia.

During the period analysed the total production of hen's eggs did not show any significant reaction to changes in producer prices. The changes in the market were affected by foreign trade measures (primarily import) rather than by domestic production.

The increase in egg production affected consumption and the egg market. The prices were on the decrease, and demand/consumption was on the increase. Eggs ceased to be an expensive food in many countries, which was the reason that the major egg importers became exporters.

Fig. 4

Changes in producer prices for hen's eggs in Croatia



4. Abbildung: Veränderungen der Produzentenpreise für Hühnereier in Kroatien

Jahre(1)

From 1981 to 1988 producer prices for consumer eggs decreased. After that period the prices went up, the highest prices having been recorded in 1991. After that, egg prices decreased and are now about 0.175 DEM per egg.

Due to a number of factors already mentioned producer prices have no significant impact on the level of hen's egg production.

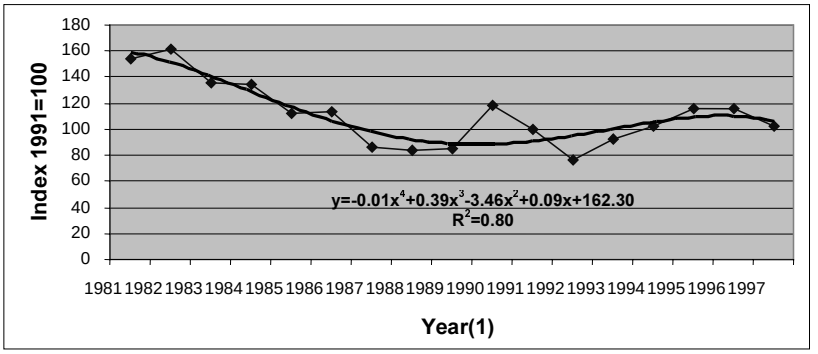
Cow's milk

For a prolonged period of time the state has been subsidising milk production, and the subsidies have occasionally changed as regards method, level and form. Milk prices are controlled by the state. The lower prices set are intended for the protection of the poorer groups of the population. This affects the participants in the milk market. The dairies

make only minimum profit from consumer milk and the trade margin is not high, which discourages traders from selling milk. Most of milk production is cow's milk production, a negligible proportion being accounted for by that of goat and sheep milk. Average milk production in Croatia is based on average low milking capacity per cow. During the recent years an increase has been recorded in total milk buying off and price.

Fig. 5

Changes in producer prices for cow's milk in Croatia



5. Abbildung: Veränderungen der Produzentenpreise für Kuhmilch in Kroatien

Jahre(1)

From 1981 to 1989 producer prices for milk decreased. A significant increase was recorded in 1990, and the next two years were a period of new decrease in price. After that, milk prices increased to about 0.4 DEM per litre of bought-off milk (premiums not included).

Producer prices for milk did not significantly influence the change in production level during the period analysed. The coefficient of determination was rather low (0.13), and producer price had more influence on the buying off level. So the loose relation between producer price and production might be explained as follows.

- Producer prices for milk have long been under direct influence and subject to intervention by the state in the interest of protecting the consumer standard of living (social character).
- The number of cows in Croatia has decreased for a lengthy period of time (on family farms because of the shortage of labour and on formerly state-owned farms because of the economic transformation), and there has been no significant increase in their average milking capacity.
- A considerable part of milk production is accounted for by the family farms with 1-2 cows on average; thus, neither production nor any increase in the number of cows is set to reflect on change in price soon.
- Natural consumption, both in households and on farms, is high.
- Some of the milk produced is processed on the farm and sold on the green markets, which presents a major problem from the aspect of milk price determination.

CONCLUSIONS

The annual changes in producer prices for cattle breeding production are significant for the period analysed; however, due to the longer biological production cycle the reaction of producers to price changes is slower (coefficient of determination 0.14). The most significant proportion of meat cattle production is accounted for by farms with a small average number of cattle. At the same time the former state-owned sector, which was a large producer of beef, has been almost eliminated, so the current low level of production could not react faster to changes in producer prices.

Producer prices in pig production, as compared to meat cattle production, have a somewhat stronger influence on the level of production (R=0.40). The influence of producer prices on production level shifted by one year is still low (R=0.46).

Producer prices in meat poultry production for the period 1981-1997 had no major effect on change in production volume. The coefficient of determination shows that a change in production of only 8% may be explained by changes in producer prices, and a change of 25% by the effect of price from the previous year.

Total hen's egg production showed no significant reaction to changes in producer prices during the period analysed. Changes in the market were influenced by foreign trade measures (primarily import) rather than domestic production.

Producer prices for milk during the period analysed had only a slight influence on changes in production. The coefficient of determination was 0.13, and the producer price had more influence on the level of buying off.

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