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FUTURE ECONOMIC ASPECTS OF WHEAT AND FLOUR PROCESSING IN EASTERN CROATIA

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SUMMARY

If we start form the former tendencies in wheat yield and total production movement in eastern Croatia, the following phenomena could be expected in a forthcoming period:

1. Further reduction of harvested areas which will occur faster on the family farms.
2. Tendency of average wheat yield increase per hectare will be slightly faster on family farms. It is so since yields increase faster from lower to higher level than in the case of increasing from relatively high to higher level.

Projection of areas, yields and total production as well as quantitative explication of correlation between industry for final production and wheat production in wide areas of eastern Croatia was given by application of prognostic functions. Such approach, in principle, is very rare in implementation of global development policy of agroindustrial complex at home and thereby in eastern Croatia. Thus, the starting idea of this paper is also integration for its wider implementation within development of macro and micro policy as well as activities of economic factor in this area. Mutual relation in reproduction line of wheat production and processing was determined by final production degree which reduce per average annual rate of 0,41% in the retrospective period . More expressive fall is one per approximate rate of 1,47% annually in predicted period.

INTRODUCTION

The main aim of this investigation is quantitative explication of industry connection which processes wheat and its productions in Eastern Croatia area in the past with extrapolation of expected trends in the future by 2015.

Such approach is in principle very rare in the leading policy of global development of agroindustrial complex in Croatia and in the region as well. Thus, the starting idea of this paper is at the same time integration for its wider implementation within leading macro and micro policy of economic subjects activities in this area.

The use of usual prognostic functions and techniques (expert estimation, opinions, simple balances) are necessary in such cases. However, they may often approximately outline a scenario of consistent long term development.

MATERIALS AND METHODS

Functional size dependence which described trends in agricultural production of certain products often had to be explicitly expressed in the investigation used in this paper.

Thus, data were usually given in the form (*pi, ti , fi*), i = 1 ...n where *ti* values of independent variables (very often it is time) are *fi* values of dependent variables (production, yields etc.) and *pi* are corresponding data weights. Correlation between dependent and independent variable should be defined beforehand.

Thus, the rate of dependent variable change in a time interval is defined by dependence function application in example 4:

$$f(t) = be^{ct}$$

which was used in this paper.

Estimation of optimum parameters is usually deduced from requirement that deviation square addition or real value and theoretical one should be minimum i.e. minimum function is demanded.

$$F(a) = \sum_{i=1}^{m} pi[fi - f(ti,a)]$$

Problem of a minimum function F is called the problem of the smallest squares. We talk about linear or non-linear problem of the smallest squares if function af (a) is linear or non-linear one. All calculations in this paper (expect linear trend) are non-linear problems of the smallest squares. The most important task in this paper was to make a mathematical model which will describe phenomenon which increase to some saturating level A. A hypothesis on gradual growth slowing was expressed in the known Verhust differential equation:

$$y = cy\,(A - y)$$

If we suppose that wheat yield y(t) is in the time (t), then the equation describes the following principle: wheat yield increase is proportional to already

achieved yield (t) and the remaining genetic potential A-y(t). Saturation level A presents wheat yield which allows maximum genetic wheat fertility potential. Solution of equation $y = cy (A-y)$ is a well known logistic function in mathematics.

One of the main logistic function disadvantages in applied investigation of asymptotic phenomena is based on the fact that there is an inflection point (the point at which production i.e. yield per production unit begins to decrease) on the half of saturation level ($y_1 = A/2$).

RESULTS AND DISCUSSION

Since agroindustry production should contribute to the stability of the whole national economy, the relation between agricultural production and food industry should ensure the following demand:

agricultural production level	=	direct consumption of agricultural production	+	production level of food industry

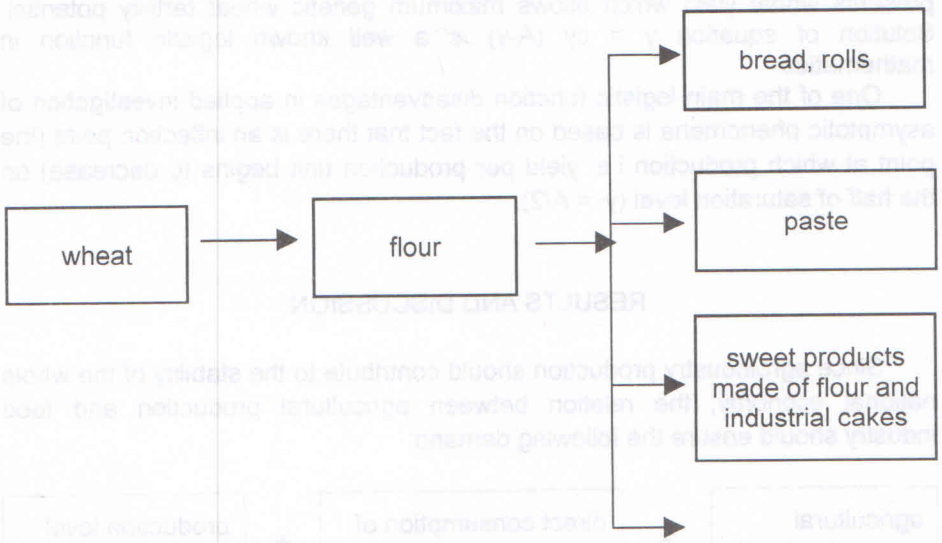
If agricultural production is higher than demands of direct consumption and food industry raw materials, there is an export possibility without violating demands of the home market.

Intensity and diversity of the relation between within agricultural production and food industry is interactively defined by capacity possibilities. Capacity limits mostly exist in agricultural production whereas food industry capacities may, so to say, completely develop independently. Accordingly, wheat processing degree will in principle depend of capacities of processing industry in the region. that's why additional hypotheses are also introduced at wheat processing degree analysis:

- current food industry capacities for wheat processing which, in principle, should be completely fulfilled.
- capacities for wheat processing may be developed by the wheat production capacity limit i.e. possibilities which give land capacity via quantity and quality estimation as well as genetic potential of wheat fertility on gravity comprised area.

Correlation of industry for wheat processing and wheat production at eastern Croatia level in the retrospective period (from 1980 to 2000) and estimation of expected interactive development in the period by 2015 will be determined in the further text.

Figure 1. Processed structure of reproductive wheat lines



Processing degree of each product which is reproduced within this reproductive lines should be defined in order to define mutual relations in reproductive wheat production lines. Retrospective period as well as expected processing structure moving in reproductive wheat line within the prognosis of observed period can be seen from Table 1.

Since the real production value on each place represent theoretical (prognosed) production on the basis of the most suitable tend (by which annual oscillations is included), it was justified to take only some representatives of the time series which are equally arranged. Thus, 1980., 1985., 1990., 1995. and 2000. were taken from representative analysis whereas 2005., 2010. and 2015. were taken from prognostic period analysis.

It can be seen from the table that wheat processing decrease of per approximate rate of 0,74% in retrospective period and more noticeable decrease was at a rate of 0,85% annually in the prognosis period. Wheat processing decline was especially noticeable in flour production. It amounted to 31,01% from 34,02% of processing wheat in 1980 almost at the end of the retrospective period. So, only 26,10% of flour was obtained at the very end of the prognosed period which represent approximate decline rate of 0,78% annually in the total monitored period.

Of the flour produced in eastern Croatia the amount which was processed in food industry in the region represented significant increase (approximate annual rate of growth in the retrospective period was 1,38%). This increase was carried into the prognosis period (approximate rate of growth of 0,81% annually) but it indicates lower tendency of increase than in the retrospective period.

Small amount of wheat which reached the highest finishing degree(production of bread, rolls, paste and sweet products) in food industry of eastern Croatia couldn't prevent unprocessed wheat outflow outside the region in spite of slight increase of growth rate.

Such fundamental tendencies for retrospective period in the reproductive line of wheat production and processing was also carried into the prognostic period in eastern Croatia.

Namely, it is obvious that:

- share of unprocessed wheat increases
- share unprocessed wheat decreases via flour productions, whereas
- share of wheat which was processed via higher processed degrees in food industry of the region was very low.

Table 1. Structure of wheat processing in the period from 1980 to 2015.'

Year	Product	Wheat	Flour	Processing	
				bread, rolls and others	
Retrospective period					
1980	Wheat	57,19	34,02	7,74	1,05
	Flour	-	79,35	18,17	2,48
1985	Wheat	57,91	32,20	8,17	1,12
	Flour	-	76,48	20,85	2,88
1990	Wheat	58,59	31,01	9,05	1,16
	Flour	-	74,15	22,16	2,88
1995	Wheat	44,21	37,52	16,22	2,09
	Flour	-	75,45	23,70	3,01
2000	Wheat	57,67	31,40	9,70	1,23
	Flour	-	74,75	26,05	3,45
Rate of change %	Wheat	-0,21	-0,74	3,36	1,13
	Flour	-	-1,14	3,27	1,38
Prognostic period					
2005	Wheat	58,80	30,15	9,75	1,24
	Flour	-	74,75	26,05	3,45
2010	Wheat	60,30	28,95	9,50	1,25
	Flour	-	71,01	27,50	4,65
2015	Wheat	63,22	26,10	9,42	1,26
	Flour	-	68,50	28,75	4,95
Rate of change %	Wheat	1,54	-0,85	-0,25	0,17
	Flour	-	-0,35	0,85	0,81

CONCLUSIONS

Almost all processing degrees were present within the monitored reproductive units of wheat production and processing. However, they had insufficiently diverse production programs, especially the highest processing degrees. It was also found out that basic raw materials were not sufficiently comprised by utmost degrees of processing since total produce wheat in the monitored period was processed between 8,83% in 1980 and 11,11% in 2000. In the prognostic period about 10,66% of produced wheat was expected to be processed in processing capacities of the region by 2015.

These tendencies were the result of primary production (raw materials based of food industry) in spite of decrease of total agricultural lands and tendencies of yield increase in the prognostic period.

Capacity and industry structure for wheat processing in eastern Croatia do not allow absorbtion of such increased raw materials base. Thus, important part of wheat in the prognostic period is expected not to be processed via region processing capacities. So, expanding capacities modernisation for wheat processing as food industry in the region is a necessary prerequisite for efficient use of the region comparative advantages in wheat production and processing.

BUDUĆI EKONOMSKI POKAZATELJI PRERADE PŠENICE I BRAŠNA U ISTOČNOJ HRVATSKOJ

SAŽETAK

Ako pođemo od dosadašnjih tendencija u kretanju prinosa ukupne proizvodnje pšenice na području Istočne Hrvatske, narednom razdoblju bi se mogle očekivati sljedeće pojave:

1. Daljnje smanjivanje požnjevenih površina, s tim što će se nešto brže smanjivati na obiteljskim gospodarstvima.

2. Nastavit će se tendencije povećanja prosječnih prinosa pšenice po hektaru i to nešto brže nego na obiteljskim gospodarstvima, zbog toga što se prinosi brže povećanja s niže na višu razinu nego u slučaju povećanja s relativno visoke na još višu razinu.

Primjenom prognostičkih funkcija dana je projekcija površina, prinosa i ukupna proizvodnja, te kvantitativna eksplikacija povezanosti industrije za finalizaciju s proizvodnjom pšenice prostranom obuhvatu Istočne Hrvatske. Ovakav pristup je, u načelu, vrlo rijedak u provedbi politike globalnog razvitka agroindustrijskog kompleksa u zemlji, a time i u području Istočne Hrvatske, pa je i prolazna ideja ovog rada ujedno integracija za njegovu širu implementaciju u okviru

vođenja makro, a time i mikro politike i aktivnosti gospodarskih subjekata na ovom području.

Međusobni odnos u reprodukcijskoj liniji proizvodnje i prerade pšenice utvrđen je stupnjem finalizacije koji opada po prosječnoj godišnjoj stopi od 0,41% u retrospektivnom razdoblju, a još je izraženiji pad po približnoj stopi od 1,47% godišnje u razdoblju prognoze.

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