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AGRO-INDUSTRY AND RURAL DEVELOPMENT <sup>1/</sup>

(WITH PARTICULAR REFERENCE TO THE  
AGRO-INDUSTRIAL COMBINE SRBIJA-10 OCTOBER)

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## AGRO-INDUSTRY AND RURAL DEVELOPMENT

(With particular reference to the agro-industrial combine Srbija-10 October).

### INTRODUCTION

The agro-industrial combine "Srbija-10 October" at Velika Plana, Yugoslavia was established in 1968 through an integration of the meat combine - "Srbija-10 October" and the farmers' co-operative, both at Velika Plana. At a later date, six farmers' co-operatives joined the combine, which at present works in collaboration with farmers in a region covering five townships, an area of about 50 kilometres in diameter.

#### 1. Characteristics of the region

The region covered by the combine is situated in the middle of the Velika Morava valley, while parts of it stretch along the valleys of the Raca and Jasenica rivers, tributaries of the Velika Morava. The plain lies at an altitude of 90-100 metres and the hills reach an average height of 150 metres.

Natural conditions in the region are conducive to the cultivation of many crops, such as wheat, maize, sugar beet, sunflower, alfalfa, red clover, as well as orchards and vineyards.

The temperate continental climate, featuring cold winters and hot summers is somewhat milder in the hilly part of the region. The mean annual air temperature is about 10.7 to 11.7°C, but variations during the year are substantial. The mean temperature during the growing period is about 18.5°C, reaching about 22°C in July and August. The absolute maximum temperature reaches 39.2 to 40.6°C, temperatures dropping to -29°C. Average precipitation amounts to 600-650 mm. annually (about 25"). The precipitation during the growing period averages 350 mm. (about 14"), distribution being uneven.

Soils of the region are of the following types: alluvium, meadow soil - alluvial smonitza and brown forest soil. Brown forest soil can be observed in the process of leaching, as well as eroded and leached, while some smonitza is in the process of browning and leaching.

The population density of the region is higher than that of the country as a whole (in Velika Plana 145 inhabitants per sq. km.). About 90 percent of the households own land, and only 40 percent are purely agricultural households, i.e. without members of the family employed outside the farm.

Part-time agricultural households, i.e. members permanently employed outside the farm, prevail among holdings which co-operate with the combine. However, their degree of co-operation is limited by the number of people available to work in agriculture.

Purely agricultural households are decreasing both in relative and absolute figures since the majority of young people seek employment in non-agricultural occupations. Hence, the number of holdings owned by elderly people is steadily increasing.

There has been an appreciable shift in the population, with marked migration from the southern mountainous part of the country as well as a greater concentration in the major conurbations - Belgrade, Kragujevac. Recently, many farmers or members of their families have left to take up temporary employment in Western Europe, to take advantage of the exchange rate as yet unadjusted in terms of real purchasing power, and the higher wages offered in the industrialised countries. The money thus saved by most of the farmers is invested in mechanization and other improvements on the farm and in the households.

The size of farms in the region is unfavourable: in Velika Plana the average size of a farm is 2.70 ha. with plots of a mere 0.24 ha.

The agricultural production, in particular stall-fed cattle and

pig breeding, is advanced in the region as compared with the national average. The region is well known for local breed of red-white Swiss cattle (~~(\$manhaal)~~).

The characteristics listed above determine to a large extent the conditions for the development of the small holdings.

## 2. Some data on the combine

The combine, as an integrated agro-industrial complex pursues two main economic activities:

(i) Industrial activity, consisting of slaughterhouses for cattle, pigs and poultry, as well as plants for processing, fresh eggs and feathers; and

(ii) Agricultural activity, consisting of combine-owned farms and agricultural production units in co-operation <sup>1/</sup> with private farms. <sup>2/</sup>

In addition to these two activities, a retail network of seventy food stores works with the combine, selling its products throughout the country.

The production, processing industries and retail trade are integrated, pooling their resources to accelerate development along mutually agreed lines, and establishing a direct vertical link from livestock rearing through processing to selling the products direct to the consumer.

The combine co-operates with about 10,000 private farmers from fifty villages in the region.

In terms of turnover, the combine ranks 100 among the largest Yugoslav enterprises. It employs about 1,800 workers and exports above 18 per cent of its production.

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<sup>1/</sup> "Kooperacija", co-operation, is the term used in Yugoslavia to describe collaboration in production and marketing between farmers' co-operatives or combines and other interested organizations on the one hand, and small ("individual") farmers on the other.

<sup>2/</sup> There are two kinds of farms in Yugoslav agriculture: "social" or "socially owned" farms, are large farms managed by the workers, permanent employees of the farm. Agro-industrial combines belong to this type of farm. "Private" or "peasant" farms are small farms not exceeding 10 ha. (about 25 acres) of arable land.

## 1 METHOD AND EXTENT OF CO-OPERATION

Ninety per cent of the land in the region covered by the combine is owned by private farmers. In order to secure sufficient quantities of good quality raw materials for the uninterrupted operation of its industrial plants, the combine organizes production on private farms through contracts and collaboration. The combine even adjusts its own organization to the needs of co-operation with private farms. It has organized its own agricultural extension service, staffed by experienced agriculturists and veterinarians which are located in the villages and suited to the specific needs of each village.

At the inception of co-operation as a method of agricultural development in the region, mixed production prevailed on the private farms as the consequence of an undeveloped market and the lack of capital. The combine offered to co-operate with the farmers in various programmes, all of which required the farmers to specialize in the production of selected commodities for the market, the combine having undertaken to secure the necessary means and know-how. Since the formation of the combine, methods of co-operation have been improving.

Circumstances which facilitate co-operation with local farmers are:

- easy adoption of innovations and familiarity with rearing practices especially in livestock husbandry, and industrious farmers;
- farmers' traditional association with co-operative societies dates back sixty to one hundred years;
- high literacy of the population of the region owing to mandatory primary schooling;
- existence of fertile land, stables and other buildings and equipment necessary for successful agricultural production;
- the population's relatively good technical skills.

Co-operation in production between the combine and private farmers is developing both in crop farming and livestock husbandry. Various co-operation programmes are offered by the Combine suited to the size of the farms and their production abilities, and the farmers select with the aid



of the agricultural extension service the programmes most appropriate to their farms.

### 1. Co-operation in animal husbandry

Co-operation in animal husbandry between the combine and local farmers is being developed in cattle and pig breeding as well as in poultry production.

#### Pig Breeding

The most important crop in the region with a relatively high yield per hectare is maize, thus the breeding of pigs has been long associated with the region. However, before co-operation programmes were organized, breeding activities concentrated upon the local fatty type breed. Thus, co-operation programmes aimed at the following objectives:

- Replacement of local breed by more productive, meatier breeds;
- the organization of appropriate feed stuffs and nutrition for new, more productive breeds.

Some fifteen years ago Landrace swine was introduced to the region, first from the Netherlands and then from Sweden. The combine's farm of 800 sows is a breeding centre which supplies co-operating farmers with gilts of these meatier breeds.

The feed-stuff mixing plant was built in 1963 and produces appropriate feed mixtures for various kinds of livestock and poultry in the region.

The favourable conditions, in particular the price incentives offered to the farmers, assured the rapid adoption of more productive stocks, and today only white meatier breeds are reared in the region.

At present, farmers specialize either in the production of breeding stock or in the breeding of fattening stock. The first speciality, i.e. the production of piglets, is practiced by farmers who possess buildings and other facilities for the breeding of sows of the meatier white breeds.

Co-operation in stock breeding can take on two forms. In the first instance, farmers who dispose of their own means for piglet production, make a contract with the combine to supply piglets at agreed times

and price. A contract of this kind guards the farmers against the major price fluctuations which have recently been experienced on the market. However, the number of farmers adopting this form of co-operation is low and usually only small quantities of piglets are produced.

More popular is the second form of co-operation where the farmers provide material and labour inputs, and produce piglets on behalf of the combine. The breeding sows, piglets, feedstuffs, veterinary service, insurance etc., are supplied by the combine and are used by the co-operating farmer in his breeding programme. The farmers receive compensation for labour and the depreciation of his buildings and equipment, based on the total liveweight of the piglets delivered, 20 kg. each. The combine regularly culls sows it supplies, replacing them with selected gilts in pig.

The number of sows reared by a farmer differs, depending mostly on its sty area.

The rights and obligations of both partners, combine and farmer are defined in contracts of at least ten years' duration, which ensures stability in the operations of both partners. A co-operating farmer of this type can, if he desires, acquire the status of a permanent worker of the combine, which, inter alia, ensures him social security, i.e. health insurance and pension rights, which in Yugoslavia are privileges for small farmers.

The rearing of porkers also requires farmers equipped for the purpose. Here again, a limited number of farmers rear porkers on their own, and make contracts with the combine solely to ensure favourable marketing conditions for their produce. A far greater number of farmers co-operate with the combine in pig fattening schemes. The primary reason is that a larger amount of capital is required for investments in buildings and equipment as well as for the purchase of piglets, feedstuffs and other materials and services, and private farmers lack just these capital resources.

Before co-operation with a farmer in the production of porkers starts, new buildings must be erected or existing sties modified and re-equipped: an operation that usually takes six to twelve months.

As in the case of stock breeding in co-operation with the combine, the farmer provides the sties and labour, whereas the combine supplies

piglets for fattening (usually of 20 kilograms live weight), and feed mixtures, as well as veterinary protection, insurance and know-how. The standard rates of feedstuff consumption per kilogram liveweight gained are contractually stipulated and any eventual savings are to the benefit of the co-operating farmer as are all feed surpluses. The farmers are further compensated for labour and the depreciation of buildings and equipment, such compensation being computed according to agreed terms and standards, and on the basis of the final live weight of the piglets originally supplied by the combine. Thus, co-operating farmers are interested not only in being supplied with good quality piglets and feed mixtures but also in producing good quality porkers.

Co-operation in the breeding of porkers is usually agreed upon for a period of five to ten years. Here again, the co-operating farmer may acquire the status of a permanent combine employee, provided he meets the minimum target set in terms of value for porker production every year.

The basic characteristics of co-operation in pig breeding are as follows:

- the capital and other means of production required, except accommodation and equipment for which the farmer can get a loan from the combine, are supplied by the combine;
- the farmer can gainfully employ himself and his family, utilize, and be compensated for his buildings and equipment, and be free from the risk of price fluctuation;
- the long-term contracts ensure stability of production and permit proper planning, thus satisfying both partners in terms of quality, quantity and production dynamics;
- the mode of co-operation can be adjusted to suit the needs of all types of farmers.

#### Cattle rearing:

As above, co-operation in this type of production takes on two forms: dairy farming and fattening of yearlings (baby beef).

As mentioned previously, the region is well known for the Swiss red-white breed of cows raised there. The Insemination Centre at Velika

Plana which has fifty imported bulls, has contributed greatly to this. On an average, there are only two to three cows in milk per farm, which is insufficient in terms of labour utilization and profitable milk production. There has been a resultant decline in interest in dairy production, since it has been estimated that for milk production to be profitable at least ten cows yielding 30,000 litres of milk per annum are needed.

The combine, thus, aims at establishing, by means of co-operation, specialized and profitable dairy farms, each with an appropriate number of cows in milk. A pre-requisite for this type of co-operation is that the farmer should own sufficient land in order to be able to produce the amount of fodder required for the projected number of cows.

The co-operating farmer should also have adequate sheds for the cows, and he can apply for a loan from the combine to build new sheds or modify and properly equip existing buildings. He is supplied with cows or heifers in calf by the combine on favourable credit terms: five years for cows and up to ten years for buildings. Upon repayment of loans given, the cows become the property of the farmer; however, he is obliged to continue his production and to deliver milk and meat to the combine at market prices. Usually, the farmers do not sell the offspring, but fatten them to about 450 kg. live-weight before selling them to the combine. Selected female calves are bred to heifers for further breeding.

Farmers repay credits in the form of milk and meat deliveries.

During the preparatory period lasting at least twelve months it is necessary to:

- select appropriate holdings which will specialize in dairy production, it being noted that farmers who lack experience and do not dispose of an adequate young labour force do not qualify for selection;
- elaborate long-term development programmes for the selected holdings;
- secure funds for financing the development programmes;
- prepare the purchase of required number of cows and heifers in calf;
- erect or modify properly equipped sheds, ensuring proper

- facilities for the hygienic production and delivering of milk; and
- organize the production of requisite fodder.

The rights and obligations of the partners are stipulated in a contract of at least ten years' duration. The farmer participating in this form of co-operation may assume the status of a permanent employee of the combine, provided he produces the minimum production in terms of value.

The development of these specialized dairy farms is still at an infant stage, hence the majority of persons currently co-operating are farmers with two or three cows. The contracts concluded guarantee that the combine will purchase at the prevailing market price all the milk and fattened yearlings produced. Farmers usually make their own provisions for feedstuffs; however, upon request, an advance in money or feedstuffs might be granted to them. The combine might also grant them a five-year loan to produce cows or heifers.

Co-operation in the fattening of yearlings ("baby beef" - usually weighing 200-450 kg.) is carried out with farmers who fatten calves reared on their own farms, or with farmers who specialize in fattening bullocks, calves being supplied by the combine.

At present, the first type of co-operation is more common but is slowly giving way to the other type.

Farmers fattening the offspring of their own cows conclude contracts with the combine to assure marketing at the market price of the day of delivery. They secure their own feedstuffs and other material, but if so required, these may be paid in advance.

The second type of co-operation requires much more investment on the part of the combine, whereas the co-operating farmer should have appropriate sheds and the requisite labour. The barns should be suitable for use throughout the year, and, if it is planned to fatten a large number of cattle in one cycle, appropriate facilities for manure disposal should be provided. As a rule, the sheds are built according to models designed for a specific number of cattle where provision has been made for mechanization in a separate process.

Under this type of arrangement, the combine supplies bullocks for fattening, feed mixtures, veterinary service, insurance and know-how, whereas the farmer supplies labour and his own shed and equipment.

Standard rates pertaining to labour and feedstuff requirements per kilogram of live weight gained are mutually agreed upon, and any savings and excesses are accounted to the farmer accordingly.

Two cycles of fattened bullocks should be delivered annually, final accounts being done upon the completion of each completed cycle whereby the farmer is compensated for labour and depreciation.

Farmers who specialize in the fattening of bullocks usually maintain production over extended periods but conclude contracts with the combine only for five to ten years.

As mentioned above, fattened bullocks have a live-weight of 200 - 450 kg. However, some farmers specialize in the rearing of weaned calves, 100-200 kg. which are then transferred to farmers specialised in fattening bullocks.

These farmers also obtain the weaned calves from the combine and conditions for co-operation are similar to those pertaining to the fattening of bullocks.

Farmers who fatten bullocks or rear calves in co-operation with the combine may acquire the status of a permanent employee of the combine.

## 2. Co-operation in the production of field and forage crops

Crop farming on private farms is mostly oriented towards livestock husbandry, the main crops being maize, barley and green fodder crops. Hence, the crop-farming inputs contributed by the combine in its co-operation with private farmers, such as machinery services, ploughing, weed and pest control, harvesting, seeds, fertilizers and pesticides, are mostly repaid in the form of livestock and livestock products to the combine.

Although the combine provides some machinery services using its own machines, it also employs private agricultural machinery services. Farmers also require increasing assistance in weed and pest control. Among other crops, particular co-operation is needed in the production of seed

for alfalfa, red clover and lotus (*Lotus corniculatus*).

With respect to fruit and grape production, the combine supplies the co-operation farmers with pesticides, and purchases the fruit and grapes.

3. Extent of co-operation

Year	1968	1972	9 months 1973
Number of porkers produced	12,600	35,400	34,500
Number of bullocks fattened	2,790	9,570	10,220
<b>Purchases</b>			
meat (metric tons)	270	526	390
milk (,000 litres)	512	1,730	1,642
fruit (metric tons)	350	3,000	890
<b>Supplies to farmers</b>			
fertilizers (metric tons)	1,720	6,050	6,570
feed mixtures (metric tons)	812	5,620	6,720

By virtue of its own farm production and through organized production on a co-operation basis with private farmers, the combine supplied its own slaughterhouses with 50 per cent of the porkers and 75 per cent of the fattened bullocks. The established aim of the development plan is to ensure the supply of the slaughterhouse's complete livestock requirements by means of co-operation within the region.

## II THE COMBINE'S CONTRIBUTION TO REGIONAL AGRICULTURAL DEVELOPMENT

The farmers' co-operatives, before joining forces with the combine, had their own agricultural services and programmes of work, but they failed to obtain any substantial capital backing. Upon the establishment of the combine and the subsequent integration of co-operative societies, social farms and processing plants in the region, human, material and financial resources were pooled facilitating the implementation of more ambitious programmes. Through the combine's activities and the introduction of higher yield seeds, more productive breeds of livestock breeds, and improved agricultural methods, the output of peasant farms has increased substantially.

### 1. Changing livestock breeds and increasing livestock productivity

Pigs and cattle are the most important branches of animal husbandry. The breeding of cattle can look back over a long tradition. As early as 1912, progressive farmers were awarded prizes for the successful rearing of Swiss red-white breed. Careful selection under the guidance of agricultural services has played an important role in cattle improvement in the region as have imports from Switzerland, Germany and Austria. The region has become a well-known centre for supplying other regions with local strains of Simental cattle.

Insemination is 100 per cent and records show that yields exceed 3,500 litres of milk per cow annually with a fat content of over 3.8 per cent. The programme drafted by the combine aims at having a number of private farms rear a larger number of cows in appropriate sheds and adjust their crop production accordingly.

During the last ten years, pig breeding has undergone a sweeping change. Over 90 per cent of the porkers marketed are meaty types, Dutch and Swedish Landrace, or their hybrids. The nucleus of breeding sows is reared on the combine's own farm and selected gilts in pig are distributed to the farmers co-operating in the scheme. At present, on private pig farms, a kilogram of liveweight is obtained from 3.9 - 4 kg. of feed. The combine's immediate aim is the development of a sufficient number of specialized privately owned "mini-farms" where only selected sows are to be reared and an adequate number of piglets will be produced



to satisfy the needs of the combine's slaughterhouse.

In order to develop poultry production, the combine has established a hatching centre ("incubator station) as a self-accounting unit. The Centre produces one-day chicks of mixed and meaty races, distributing them in order to replace the local low-yield strain and thus increase the production of poultry meat and eggs. In co-operation with private farmers the centre has also organized the production of broilers. The annual output of the centre is about a million one-day chicks, half of which are sold to farmers as layers.

With respect to the production of broilers, the combine supplies the equipment, one-day chicks and the requisite quantities of feed, whilst the co-operating farmer rears the broilers. Standard rates pertaining to feed and other costs including labour per kilogram of liveweight, are mutually agreed upon and contractually stipulated. Remuneration is based upon the total weight delivered to the combine's poultry slaughterhouse.

A farmer may rear a few hundred or a few thousand broilers in one cycle. Broiler production is regarded by many farmers as a source of additional income, however, some specialise in this field and consider it their main source of income.

A specialized team of agriculturists and veterinarians guarantee the success of the poultry production organized by the combine in co-operation with private farmers.

## 2. Improvements in the production of field and forage crops

Thanks to the combine's co-operative endeavours, local varieties of wheat are being replaced by high yield strains. Target areas under wheat were sown using the following strains, libelula (Italian), bezostaya 1, kavkas and aurora (Russian) as well as sava, zlatna dolina and other high yield Yugoslav varieties.

Local maize varieties as well as the US hybrid Kansas 1859 have been replaced by the high-yield Yugoslav hybrids, which have been designated ZP SC-1, ZP SC-3, NS SC-70 and ZP DC-755. Furthermore, newly developed maize hybrids produced by the specialized institutes in Zemun Polje, Novi Sad and Osijek have gained ground.

Apart from wheat and maize, the combine supplies the farmers with high-yield seeds of other crops, such as sugar beet and sunflower, and assists them in planting appropriate varieties.

Co-operation as a means of assisting private farmers in increasing their output, productivity and income, is reflected in the rapidly increasing use of fertilizers. The farmers who co-operate with the combine currently utilize on an average 80 kg. N, 45 kg.  $P_2O_{15}$  and 45 kg.  $K_2O$  per hectare.

In Velika Plana, the combine has established its own veterinary station. Other townships in the region have organized their own veterinary services, which monitor livestock and poultry diseases in their respective territories. They take particular care to prevent disease amongst livestock and poultry reared in co-operation between the combine and private farmers. The combine, pursuant to the contracts on co-operation, bears the cost of these veterinary prevention services.

High-yielding varieties of crops and capital intensive orchards and vineyards necessitate intensive pest and weed control. The combine supplies the requisite quantities of pesticide and herbicides, the utilization of which has markedly increased in recent times.

Owing to ever increasing intensity in agricultural production and to the migration of manpower away from agriculture, the mechanization of both crop and livestock production has developed rapidly.

Expensive machinery, such as combine harvesters and heavy tractors, are owned by the combine, which also serves the farmers. Other agricultural machines are mostly owned by individual farmers <sup>3/</sup>, but the combine provides machinery services to other farmers who do not own machines. The farmers may also purchase agricultural machinery through the combine, and the complete mechanization of both crop and animal production is one of the objectives that have been set.

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<sup>3/</sup> Farmers in Velika Plana alone own more than 350 tractors and the necessary attachments.

The combine has developed its own agricultural service staffed by about 150 university graduates and technicians. In each village in the Velika Plana area for example, three members of the service are working on an average.

The agricultural service assists farmers in co-ordinating their production with that of the combine and in adopting the appropriate agricultural practices. Through the vehicle of seminars, group discussions and plant visits, farmers are shown how to adopt and apply properly the means of increasing productivity and production.

As a result of this co-operation, productivity and production in both sectors have increased substantially. Data on increased livestock production are given above. In crop farming, the yield per hectare has greatly increased as compared with previous levels for the region and for Yugoslavia as a whole. For example, the average yield of maize per hectare increased from 27.4 quintals in 1965 to 40 quintals in 1973.

### III THE COMBINE'S CONTRIBUTION TO THE BETTERMENT OF RURAL LIFE

The fast rapid of agricultural production brought about by co-operation with the combine and the rise in the rural population's living standards are two mutually dependent, closely linked and complementary processes: both parts of a unique development and reconstruction process affecting both agriculture and rural life.

The combine exerts a two-fold influence upon these processes: a direct influence by increasing productivity, production and the income of the farmers who co-operate with the combine, and an indirect influence by participating in those actions and activities which contribute to the growth of social standards, for example, in the construction of roads, water supplies, health clinics, schools, etc.

These actions, in which both the combine and the local population participate contribute not only to the increase in social standards, but also to an increase in agricultural production. All-weather roads reduce transportation costs and permit mechanization of agriculture.

In one village, Radovanje, the population and the combine co-operated to establish a water supply. As a result, the production of quality porkers became profitable, and at present this village with a population of 1000 inhabitants, produces 5000 porkers annually. Nearly all the villages in the region are linked by all-weather, asphalt roads, which were built on a voluntary basis by the population, local governments and the combine.

The farmers who co-operate earn about 50-100 per cent more than the small number who do not.

#### IV CONCLUSION

The development of agriculture on private farms by means of co-operation with the combine, has proved rewarding. Agricultural production and the standard of living have increased substantially, and invaluable experience gained for future action. There are numerous proven means of increasing agricultural production and productivity appreciably. The combine shall continue to apply the methods of co-operation and further develop it in order to mobilize more fully the existing potential for agricultural development of private farms. By developing other forms of co-operation as well as by intensifying the application of those already tested, modern agricultural methods and practices will be made known to new farms and new production lines introduced on farms already co-operating. All this will contribute to an even faster development of agricultural production and rural life, to the betterment of agricultural and the local population as a whole.



**74.09.13**