

Technical Cooperation Programme

**A MEDIUM-TERM AGRICULTURE
SECTOR STRATEGY FOR REPUBLIKA
SRPSKA**

ANNEX 2

LIVESTOCK SUBSECTOR REPORT

by

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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ABBREVIATIONS AND ACRONYMS

AI	Artificial insemination
ARC	Agriculture Research Council
b.fat	butterfat
BiH	Republic of Bosnia and Herzegovina
DM	German Mark
EU	European Union
EU Phare	Poland and Hungary: Action for Restructuring of the Economy
FBiH	Federation of Bosnia and Herzegovina
GTZ	German Agency for Technical Cooperation
ha	hectare
IFAD	International Fund for Agricultural Development
kg	kilogram
l.wt.	Live weight
m	metre
RS	Republika Srpska
ToR	Terms of Reference

I. INTRODUCTION

1.1 Background

This report presents the findings of a national livestock subsector working group representing the Republic of Srpska (RS) comprising Mr Gojko Mirjanic (convenor), Ms Novalina Ristic (veterinarian), Ms Vera Kanlic (livestock husbandry specialist) with guidance and support from Mr Peter Finlayson, international livestock husbandry specialist on behalf of FAO.

1.2 Terms of Reference and Acknowledgements

The terms of references for the working group sought a comprehensive discussion of the pre- and post-war livestock production sub-sector in RS. It should be quantified to the extent possible, including the resource base, production and husbandry practices, support services, markets, profitability, and then identifying the current constraints and preferred solutions in relation to potential development, and existing internal resources and external assistance measures.

The consultant's ToRs were to assist and guide the working group in the preparation of its report and undertake a separate review of the potential for livestock production in RS, as well as participate in the initial and Mid-Term Review workshops which analysed and discussed the working group's findings and recommended strategy.

This report presents the results of that analysis, incorporating the working group's and consultant's views in the context of RS's physical, human and financial resources and likely donor support. It should be noted that the strategy recommendations of the working group were not always shared by the consultant who considered that some of them, while technically desirable, were unrealistically ambitious and not feasible for the Republic's present stage of development.

The consultant thanks the members of the working group for their conscientious dedication to their task and diligence in producing their report within the tight time frame of the project. Moreover, he was welcomed at all times and treated with courtesy and friendliness by the team and their colleagues. Any requests for support and facilities were made available within the limits of the institutions involved. The openness and hospitality of farmers and their families is also gratefully acknowledged.

1.3 Programme and Sources of Information

The mission programme provided for two visits to the country followed by report preparation at FAO HQ, Rome and at home base. At the first visit in May the consultant drafted the ToRs, briefed the working group, and participated in the initial workshop at which an overview of the sector issues and approach to the strategy formulation was elaborated.

During the second mission in July the consultant undertook some field visits to public sector livestock production units and commercial private farmers with members of the working group, and facilitated a two-day review workshop at Bijeljina.

The main sources of information for this report comprise the working group's report, and its subsequent verbal elaboration, project background papers, together with information and data obtained during field visits to producers and processors around Banja Luka, Pale and Bijeljina, including a small mixed farmer, an abandoned state farm, a commercial dairy

farmer, a pig producer, an egg and broiler producer, a beef cattle fattening unit, a milk processor, an integrated development project, the Mladen Stojanovic State Farm (pigs and dairy), and the Levika agro-processing factory.

In formulating these proposals, the consultant was conscious of three fundamental factors affecting the social and economic fabric of the country and the livestock subsector in particular:

- The disrupting impact of the four years of civil war on people and property, especially livestock population and facilities;
- The deeply embedded effect of 50 years of the relatively stable socialist economic system on the way people are accustomed to think about resource management and production, and
- The social and economic difficulties faced by governments and their people in having to transform the management and administration of the country from socialism into a more market-oriented system with all its uncertainties and challenges, for which many are ill-prepared and are resisting.

In particular, replacing a mentality accustomed to making management decisions to achieve maximum production (at any cost) with that which is more appropriate in a market-driven economy, including concepts of profit, input optimization, and comparative advantage, is proving difficult for many resource managers used to a more stable operating environment. Thus, strategies based on these concepts are unlikely to be immediately palatable.

II. RESOURCE BASE

2.1 The Production Environment

2.1.1 Area and Climate

In 1991, the State of Bosnia and Herzegovina comprised an area of 5.1 million ha of which just 50 percent was classed as agricultural land and less than one million ha was regarded as suitable for crop production. Table 1 shows the land use structure of the country pre-war and in each entity post-war.

Table 1: Agricultural Land Use in Bosnia and Herzegovina ‘000 ha

Land Use	BiH (pre-war)	FBiH	RS
Total area	5,100	2,618	2,482
Agricultural land	2,525	1,226.5	1,298.5
Arable (cash crops)	917	200.5	615.5
Grazing and forage ¹ :			
Pastures	932	518	385.7
Meadows	468	258	236.9
Forage	208	250	60.4

Source: Working group reports and mission calculations.

The Republic of Srpska owns 24,821 km² in total. Agricultural land totals 1,298,559 ha, of which 615,548 ha are arable land, 236,922 ha meadows and 385,734 ha grazing land, mostly above 300 and 700 m. While each entity has approximately the same area of land suited to agriculture, the Republic is better endowed with resources suited to crop production than the Federation. However, the geographic characteristics of agricultural land, its structure and climatic conditions are important for livestock production.

¹ Pastures refers to natural grassland located mostly in the mountains that is not cut for hay; meadows are (usually better) pastures that are cut for hay regularly and may be grazed; while Forages are produced on land that is regarded as not suited to cash crop production

Table 2: Agricultural Land Ownership Structure, '000 ha

Type of land	Total ha	Private ha	State ha	Pte %
Arable land	615,548	544,281	71,267	88.4
Meadows	236,922	206,321	30,601	87.1
Grazing area	385,734	139,312	246,22	35.1
TOTAL:	1,238,204	889,914	348,290	72.0

Source: Working group data

Grazing areas are mainly natural pasture and, for the most part, are owned by the state (65 percent). They are located in hilly and mountain regions of the Republic. Arable land and meadows are mostly in lowlands; i.e. up to 500 m altitude. Artificial meadows comprise 15 percent of total area and the rest are natural meadows.

The Republic of Srpska is divided into four agricultural-production regions: lowlands up to 500 m altitude, hilly 500 – 700 m altitude, mountainous above 700 m altitude, and Mediterranean. The climate is continental with four seasons. Annual rainfall ranges from 800 – 1,000 mm, spread evenly though the year, with June the most humid month and December the driest. The hottest month is July with average temperature of 20° C and December the coldest month with average temperature of 2° C.

2.1.2 Feed Resources

The feed resources of the country comprise:

- i) The area of mountainous and hilly pastures on fairly shallow soils, most of which are owned and controlled by the state. Right of use is determined and respected by custom. Botanically they comprise a mixture of grasses (*Lolium* and *Festuca spp*), legumes (*Trifolium spp*) with various less productive species and are not subject to any improved management except the animal dung concentrated in the sheep yards, which tend to be moved around the grazed area. They are available for grazing during only about three to four summer months, and so tend to be used semi-transhumantly by farmers who bring their stock from outside and stay with them in these areas during the summer. Small amounts of hay are cut, usually yielding less than 0.5t/ha. Although land mines are not a significant problem (est. 10 percent), some areas are relatively inaccessible or unusable due to lack of infrastructure, especially water availability, which is estimated to affect up to 50 percent of the potential hilly and mountain pasture area.

They are mostly used for sheep production but have not been used effectively for many years due to the decline in the popularity of sheep raising. Because of low stock numbers especially because of the war (but they were in decline before that) this resource is grossly under utilized. In addition, experiments have demonstrated that there are sufficient productive species in the sward to respond considerably to inorganic fertilizer application. However, insecure ownership and lack of stocking pressure prevents any form of improved utilization of these pastures.

- ii) Meadows are somewhat better quality pastures in lower elevations suited to permanent (mixed) livestock farmers who own their land. They are used mainly for grazing cattle and some sheep by small holder farmers who generally own less than 10 ha, and before the war it was considerably less than this. Many farms are also fragmented, which compounds constraints to improving pasture and farm management.

These pastures are grazed in the early spring by tethered or guarded animals and then closed up for the hay harvest that takes place in July. This is the principal source of ruminant feed during the long winter. The animals are either grazed on other land during this period or stall fed on green cut. Harvest is usually done manually with scythe and hand rake into loose heaps stacked around vertical poles to around 3-4 m high located in or around the field. Some horse drawn and motorized machines for cutting the pastures are in evidence.

The pasture tends to be cut at an over mature state to gain bulk but this practice sacrifices quality (lower digestibility and lower protein) with a consequent negative impact on winter animal production. Hay yields are in the order of 1.3-1.5 t/ha. Again these pastures would respond considerably to fertilizer application with tested yields of over 4 t/ha, but most farmers are either not aware of the benefits or are not motivated to use such practices.

- iii) The third main resource is the area of land that is used for the production of forage crops, including maize for silage, sown clover and alfalfa that are used mainly for cattle and horses.
- iv) Maize of grain is the largest crop in BiH and in each entity, and this is used as the main energy base for concentrate feeds, supplemented by mostly imported protein and mineral additives. These rations are the main input to the substantial poultry and lesser pig industry and used as supplements to improve the quality of cattle feeds.
- v) The maize stover and straw left after the cereal harvest also contribute, although rather poorly, to ruminant nutrition. Experiments with alkali or liquid nitrogen treatment of these roughages have been shown to enhance their digestibility but the practice has not been widely promoted or adopted. If linked with a source of by-pass protein, such as soya cake, these treated crop residues can be profitably fed to cattle as a sole production diet.
- vi) Other sources of animal nutrition include grazing under orchards and light grazing in some (fringe) forested areas, although livestock are forbidden by law to enter these areas.

2.2 Pre-War Livestock Production and Management

2.2.1 Production

Livestock production makes up a significant portion of national wealth and is a very important source of animal foodstuff, milk, meat and cheese, as well as providing the raw materials for leather, wool, fur, fat, feather, silk, wax and other industrial products. There were about 540,000 farming households in BiH, mostly mixed livestock and crop and mostly operated at a low input subsistence level of production, although some commercialization and specialization had begun to emerge during the 1980s. Surplus (traded) production was not more than 30 percent of total output.

Before the war, 1,628,151 inhabitants lived in the area now occupied by RS; about 56 percent was rural population living in 258,489 households. Approximate farm size in lowland area is 3.5 ha and in hilly and in mountain regions 10 ha or more.

Because of the high rural population agricultural and livestock production played a significant role in the overall economy as it provided the main source of rural employment. Agriculture including livestock production pre-war accounted for 14 percent of GDP of Bosnia and Herzegovina and in 1997 this was 33.5 percent of RS' GDP.

Four percent of animals were kept on large production units. The state sector (ex-social sector) owned 29,800 cattle, of which 12,000 were dairy cows (several farms with 500 to 1,500 cows), 110,200 pigs, 13,000 sheep, and 2.5 million poultry. Productivity was at a level attained in intensive production units in Western Europe.

Breeding policies in the period 1945-92 were oriented towards an increase in animal production to better supply the domestic market, to increase export surpluses and to decrease or substitute imports. The main emphasis was on state farms that served both as production units and as demonstration sites for private farmers. Modern livestock technologies and exotic highly productive breeds were introduced. However, the small-scale private farmers were not supported by government and their production systems were based on low input and low technology methods.

In 1991 in Bosnia and Herzegovina there were 853,000 cattle, 1,317,000 sheep, 617,000 pigs, 95,000 goats, 96,000 horses and 6.7 million poultry – Table 3.

Table 3: Number of livestock by categories in period 1971-1991

Type and category of livestock	1971	1981	1991
Cattle, head	997,810	948,390	852,990
Cows and pregnant heifers	587,828	651,940	622,919
Steers 1-2 year old	62,789	48,073	33,370
Steers over 2 years old	35,881	15,757	11,130
Sheep, head	1,947,000	1,383,000	1,317,000
Breeding sheep	1,332,000	1,012,000	963,000
Lambs and tags	431,000	260,000	247,000
Horses, head	214,486	157,847	95,809
Mares and pregnant yearlings	58,353	33,856	22,969
Stallions and geldings	141,485	116,339	68,326
Pigs, head	468,128	558,749	616,700
Sows and pregnant gilts	73,186	97,666	116,586
Pigs over 6 months old	82,164	94,183	27,836
Fattening pigs	8,463	7,339	62,036
Poultry ('000 head)	4,706	8,656	10,607
Beehives, no.	146,605	194,633	84,511

Source: FBiH Livestock Development Strategy Report

In general, development of livestock production in the private sector was supported by the official policy only if it was closely connected with the state ('social') sector through agreements of cooperation, input supply and purchasing of products. Artificial insemination was partly financed by the state and farmers who kept licensed bulls and stallions of selected breeds and quality received special subsidies. Milk and wool production, as well as some categories of animals was also subsidized.

Within the period 1971/91 number of cattle declined by 14.5 percent, sheep 32.4 percent and horses by 55.3 percent. There were 8,683 cows (<4 percent of the total herd) on the ten state farms in 1990. At the same time the number of pigs and poultry increased by 31.7 percent and 125.4 percent respectively. These trends are largely associated with increasing urbanization of the population associated with industrialization. At the same time meat (Table 4) and milk (Table 5) productivity were increasing.

Table 4: Meat production and structure

Year	Total	Cattle meat	Pig meat	Sheep meat	Poultry	Other
1970	78,600	22,000	26,600	9,700	15,100	5,200
%	100	28,0	33,9	12,3	19,2	6,6
1980	130,200	44,500	41,400	12,400	23,500	8,400
1990	139,800	48,400	47,000	13,100	23,600	7,700

Source: FBiH Livestock Development Strategy Report

The largest increase of meat was achieved with cattle (34.6 percent), then pigs (33.6 percent), poultry (16.9 percent), sheep (9.4 percent) and others (5.5 percent). This was a result of increase in live weight of animals at slaughtering (calves from 72 to 131 kg l. wt, steers from 212 to 430 kg, piglets from 16 to 21 kg and lambs from 21 to 30 kg).

Table 5: Number of cows and ewes, total and average milk production per female

Year	Cow milk			Sheep milk		
	Number of milking cows ('000)	Total production ('000)	Average production per cow ²	Number of milking ewes ('000)	Total production ('000)	Average production per ewe
1970	470	420,625	895	1,141	32,030	28
1980	580	762,236	1,314	614	22,297	36
1990	571	880,118	1,541	462	13,460	29

Source: FBiH Livestock Development Strategy Report

Total production of cow milk in that period increased by 109 percent, and average production per cow by about 72 percent.

All milk and meat production could be marketed locally, although small quantities of baby beef and live steers were exported. Of total beef consumption, about 14.5 kg per capita, national production could meet only 11.25 kg, or 77.60 percent. According to the working group report, milk and milk products production equivalent to 170 litres per capita could not meet domestic demand, with a deficit in supply of fresh milk, cheese, milk powder and butter.

2.2.2 Management and Husbandry

Small farmers kept the major part of animals, mainly in extensive production systems: 2.28 cattle or 13 sheep per farm. An average farm comprised between one and three ha of land, divided in several plots (often some six to seven plots per farm). Feed for ruminants

² Net of milk consumed by the calf (approx. 400 l.)

consisted of grass in summer and hay and some concentrate or home-grown cereals in winter. Pigs and chicken were fed by home-grown cereals and occasionally some concentrate. Animal production level was very low.

Cattle Total number of cattle in BiH was 852,990 head, of which 3.6 percent were state owned. Of total number of cattle, 622,919 or 73 percent were cows and pregnant heifers. The RS share of the cattle herd was 355,521 head, including 255,975 breeding females. In the public sector, the number of cows was 8,683 or 28.36 percent, reflecting the practice of maintaining and rearing the followers on the state farms. The size of state farms was from 300 to 1,500 cows and private farms had one to fifteen cows, only exceptionally was this number higher. Between 10 and 15 percent of cattle farmers were engaged in commercial production, mainly in lowland regions. In part, this production structure was due to an inadequate collection network for surplus milk. Surplus milk that could not be disposed of locally had to be processed into cheese for which there was a limited market, which did not promote commercial scale production.

The average milk production per cow/year was 1,700 litres pre-war. On state farms it was 5,000 litres through 305 days of lactation, in the lowland areas on private farms it was about 2,500 litres, and in hilly and mountainous regions it was less than 1,000 litres. Calving interval was between 18 and 24 months, with first calf born at over 30 months. The milk production data do not include consumption by the new born, which can be 300-400 litres during the two-month pre-weaning period.

The low level of livestock production by small farmers is largely attributed to poor animal management and inadequate nutrition, especially during the winter, which restricted optimum growth rate of young stock and lowered milk production from the lactating female. Late weaning of calves (two months), who consumed a significant proportion of the mother's production, contributed to low surplus production. In addition, the premature slaughter of young female calves at 80-120 kg l. wt reduced meat production. This practice continues despite the law³ forbidding slaughter of genetically improved female calves and a 30 percent price premium offered to farmers to induce their retention, largely because of the (export-driven) high value of these animals and the smallholder family's need for cash.

Cattle fattening was a significant activity in RS and was practised by the state farms and private farmers based on the Simmental breed. Using maize silage and concentrates to achieve growth rates of up to 1,200 g/day, the male calves were reared and fattened to 450-500 kg l. wt for domestic consumption and export to the lucrative Italian and Greek markets. This practice continues based on the cheaper feeds bought in Yugoslavia where the grain floor price is lower.

In general, farmers considered cattle in terms of social and economic security rather than in terms of their productivity value. They sold the progeny early in response to demand and to generate cash flow, retaining females only to replace the cull cows every eight to ten years. The amount and quality of hay was inferior to needs and concentrate supplement was often not available. Often animal health services were either not available or cost too much. While the genetic potential of animals in the subsistence sector was low due to farmers' lack of use of (or access to) AI, they were not fed to existing capability in any case.

³ Decision on Prohibition of Slaughtering high quality breeding cattle, sheep, goats and pigs and their progeny.

Productivity parameters on the state farms and among the small number (est. 1,500) of commercial farmers was significantly higher than in the subsistence sector, with yield per cow closer to 5,000 litres per lactation, and calving interval of about 14 months. These performance levels are comparable with those attained in Western Europe and are due to the higher proportion of exotic breeds on the state farms and their better management.

The state farm production system for cows and followers (heifers) was based on a cut-and-carry feeding regime in which the animals are shedded for the whole year and the feed (green cut in spring and summer, and hay or silage in the winter) are brought to the animals. The followers tended to receive poorer quality feed than the cows, which undoubtedly contributed to their slow growth and long time to first calf. Small holders allowed their animals to graze pastures and meadows during the summer, but the meadows were locked up to allow a hay cut.

The dominant breed was based on the local hardy Busa cattle, many of which had been crossed with exotic breeds during the last 100 years. Comprising 65 percent of the pre-war herd, they are adapted to extensive feeding and management conditions but have a low genetic production capability. In addition, there were Simmental, 21 percent; Brown Swiss, 6 percent; Grey Tyrol, 5 percent; and Holstein-type cattle, 3 percent, mainly on the state farms.

In accord with the Law on Livestock Improvement Measures, all cows were to be mated by AI or a licensed bull. However, of the total number of breeding females (632,371 in 1990), 25.29 percent were covered with artificial insemination, and 25,313 breeding females were covered with organized natural mating by licensed bulls. That is, only 185,280 females or 29.30 percent were covered with quality insemination. Therefore, 447,091 breeding females or 70.7 percent were inseminated with the local bulls of unknown genetic value. This AI service was subsidized by government to the extent of 80 percent of its cost.

Sheep During the last several decades, the number of sheep was declining. From nearly 4.0 million in 1939 to 2.3 million in 1962, by 1991 numbers stood at 1.3 million. In contrast to behaviour in other countries where production increased despite falling numbers, in BiH production has not significantly been increased with a reduction of sheep population. This was because of poor breed composition, harsh environment for sheep and rudimentary husbandry practices, which resulted in low milk, meat and wool production.

An extensive system of sheep production prevailed in all agro-climatic zones. Eighty percent of income was derived from meat, fifteen percent from milk and cheese and five percent from wool – Table 6.

Table 6: Sheep Production Parameters, 1991

Product	Number of head produced (' 000)	Total production	Production per head, kg
Meat	900	13,100 t	12.5
Milk	462	13.4 M lit.	29.0
Wool	1,273	1,650 t	1.3

Source: FBiH Livestock Development Strategy Report

It is estimated that of the 900,000 sheep slaughtered, 650,000 were lambs at 25 kg l. wt, and 250,000 were cull sheep at 45 kg l.wt. The wool is very coarse and difficult to market, so has little value.

Sheep population consists of two groups of breed: Pramenka (about 80 percent), and its crosses with Merino (about 20 percent). The programme of crossing domestic Pramenka with imported Merino types aimed at insuring self-sufficiency in wool production was abandoned because of poor results and resistance on behalf of farmers. Pramenka, from the word meaning 'a lock of wool', has an open fleece composed of pointed locks and is an indigenous breed belonging to long-tail Balkan group of sheep. It contains a large number of varieties which are discernibly different in size and performance, including Vlasicki (Dupski), Kupreski, Privorski, Duvanjski, Glamocki, Gatacki, Kljucki, Stolacki, Podveleski, etc. Weight of ewes is between 30 and 50 kg depending on the feeding and management regime, and rams up to 70 kg. The smallest sheep in the world are the Humnjacka and the sheep in south Herzegovina which weight only 20 to 25 kg as adults. Wool is strong, with fibre diameter in the range of 33 to 50 microns on average, but yields are low, from 0.5 to 3 kg, mostly white in colour, but some varieties have grey and coloured wool. Lock length is 12 to 20 cm and more.

Sheep fertility is 90 percent on average, but under better management conditions, it is over 130 percent. Milk production is about 60 litres excluding the milk suckled by lamb during lactation lasting about six months.

Crossbreeds between Pramenka and Merino are heavier, more fertile and produce more wool of finer quality. Improvement of Pramenka and its crosses is continuously being carried out by out crossing with rams of Merinolandschaf breed, and about ten years before the war the establishment of a domestic meat sheep had began. This newly formed meat type has a split mating cycle and enables more frequent lambing.

More than 95 percent of sheep were privately owned but state farms served as reproduction centres for production of breeding rams and off-season lamb meat production. Ninety-three percent of sheep were owned in flocks of < 20 sheep, while less than one percent were owned in flocks of > 100. In RS, flock size was typically 70 – 200.

Lambs were traditionally marketed locally by direct negotiation between owner and buyer and sold throughout Yugoslavia, especially to meet the tourist demand in Croatia. Slaughtering lambs were used mainly for barbecue meat and older animals were processed into smoked meats and sausage.

Sheep milk was traditionally processed into soft sheep cheese. About 1,500 tonnes of quality soft white cheese which was marketed exclusively on the domestic market was produced in Central Bosnia, although there were attempts to export this cheese abroad.

The wool was not marketed at all, so it was used in home handwork for production of strong fabric and carpets, while fine wool was imported for domestic textile industry. Hides from all categories of sheep was also used for production of clothing and other leather goods using local and imported sheep skins and hides.

Poultry Almost all rural households held poultry. In recent decades, industrial hybrids purchased at the market, usually as one-day old chickens, have replaced traditional poultry breeds and represented the base for poultry and egg production at the household level in rural areas and on family farms, both for on-farm consumption and for market.

Pre-war poultry production was well organized and among the most successful production activities in ex-Yugoslavia. Total number of poultry in 1991 by ownership sectors was 10,607,000 head of which 5,918,000 were in the private and 4,689,000 in public sector. There were four reproduction centres on the state farms: “Agrokomerc”, Velika Kladusa; and “Peradarstvo”, Orasje for egg production, “Kokaprodukt” Gracanica, for chicken meat production and “Puran” Cazin, for turkey meat production, Table 7.

Due to their extensive production system the private farms had a low egg output, with only 54 eggs per hen per year, while the state farms achieved much higher production at around 140 per hen, although this was still below European performance standards (> 250). In the RS average egg-laying was 123 per hen, and total poultry numbered 2,678,722.

Table 7: Poultry BiH production in 1990

Sector	E g g s			M e a t (‘000 t)
	No. of laying hens (‘000 head)	Total product. (M pcs)	No. per hen	
Private	4.185	227	54	12,20
Public	1.287	181	140	11,40
Total	5.472	408	75	23,60

Source: FBiH Livestock Development Strategy Report

Overall, national production represented per capita 94 eggs and about 5.5 kg of meat. Since domestic production could not meet demand for broiler meat and eggs, a large quantity of these products had to be provided from abroad.

Pigs In BiH pig production was based on a sow herd of around 110,000 distributed approximately 80:20 private:public sectors. Some 50,000 households owned pigs. The average farmer had two sows and produced some 15-20 piglets a year. Public sector production was undertaken at four state farms at Bosanska Krupa, Nova Topola, Visoko and Brcko. A number of private producers had cooperative arrangements with the state farms and together these ‘organized’ production units controlled about 29 percent of total number of pigs, which produced 47,000 t of pork, equivalent to 10.83 kg per capita. This met about half the demand, the rest being imported from elsewhere in Yugoslavia.

On the state farms and cooperative producers the main breeds used were Large Yorkshire, German Landrace, Sweden Landrace, often crossed with Durock Jersey or Pietrain. Management and husbandry was generally in accord with best practice (animal health, nutrition, AI, etc.) with typical performance indicators of 2.2 litters/sow/year, 8-9 weaned piglets/litter and 200 days to reach 100 kg. l. wt. The pigs were sold at either 25 kg l. wt to fatteners or for suckling pig consumption, or retained to 90-100 kg.

Horses Horses are a traditional animal in BiH used for draught, sport, entertainment and recreation. Nevertheless, the number of horses in BiH has been continuously declining because of introduction of mechanization in the regions of intensive agricultural production, and breeding of draught horses has gradually been abandoned. Before the war, the sale of slaughtering horses to Italy and France was very important. Numbers had declined to 95,809 in 1991, practically all privately owned, and mostly used in the mountains and hilly areas.

According to available data in BiH, the Bosnian Mountain breed accounted for 70 percent of total number, and 30 percent were other breeds, including the Lipizaner and its crosses. This breed came to BiH at the end of the last century to produce a large horse for military purposes.

In the RS there were 38,578 horses in 1991, mainly used for draught purposes, but three studs (Lippizaner, Arabian and Mountain horses) maintained breeding activities, including a stud farm at Prnjavor with some 60 mares and six to seven stallions.

Fish Despite abundant water resources, particularly fresh water, fish have a low consumption in BiH at around 2.6 kg/capita (compared to Portugal, 60 kg). Besides undeveloped facilities, the reasons are low dietary importance and irregular market supply, although it is recognized that fish meat is a high quality and healthy protein food. Investments in more intensive production facilities are relatively small with reliance on the utilization of natural resources.

Bosnia and Herzegovina has available water resources which represent a large natural potential for production. Salt water resources in BiH cover 18 km of seacoast and 1,400 ha of nautical area. There are 365 fish species and 56 species of other sea animals living in Adriatic sea of which only 82 species are used for human consumption. Salt fish production was about 10 percent of total catch. Sardine was represented the most (70 percent), then Anchovy (7 percent), Papalina (2.5 percent), Large Blue fish (2.5 percent), etc.

Fresh water resources cover 20,000 km and 400 ha of natural lakes. There are 18,200 ha of reservoirs which serve for energy, irrigation, water supply and flood protection, as well as for commercial and sport fishing. There are 160 fish species living in the fresh water of which 10 percent are used. Annual catch of fresh water fish was 4,620 t of which 3,523 or 76.25 percent in the public fish ponds. The annual catch contributed only 38 percent of demand.

In RS there were four ponds covering an area of 2,700 ha, yielding 1,200-1,500 kg. carp per ha per year.

Bees Apiculture is insufficiently developed in BiH. In 1991, 620 tonnes of honey were produced from 84,511 beehives, or 7.3 kg per hive, which was insufficient to meet demand. In RS there were 40,000 hives with average honey production of 3kg/hive. Existing number of beehives is so small that available feeding capacities of bees are underused. Given the large flora resources (melliferous and medicinal herbs) honey production could be improved considerably and significant quantities produced for export.

Apiculture is mostly undertaken on small specialist producers having a smaller number of hives. About 80 percent of households have up to five hives. In BiH the type of bee which is raised is the indigenous 'Kranjska' bee which has a number of varieties. Famous breeds common in ex-Yugoslavia included dalmatinski, pohorski, homoljski, sarplaninski, sjenicko-pesterski, etc.

2.2.3 Animal Breeding and Recording

An intensive system of performance recording was carried out on the state farm animals and commercial producers at what were known as A and B level controls. 'A' control meant obtaining data about milk quantity and quality (butterfat) every 15-30 days, 'B' control meant the same data every two months. A further level 'Z' obtained data about the breeding history of the animals but without production records. A and B control data were obtained from about 20,000 to 25,000 cows, but the records were all destroyed during the war

when the Faculty of Agriculture was burnt. This work will have to commence from the beginning.

2.2.4 Animal Health Services

Veterinary stations were established in BiH in 1949 to carry out animal health care and to manage the veterinarian service that was set up and governed within a comprehensive legislative framework. In 1991, there were 104 veterinary stations in 107 municipalities providing services at 181 veterinary clinics, 33 branches, and 327 veterinary points. These were supported by three regional diagnostic laboratories: Sarajevo, Zenica and Brcko; 48 veterinary pharmacies and 37 other facilities (meat processors, poultry and fish breeding units). These institutions employed some 400 veterinarians and 600 support staff. One hundred and eleven veterinarians were employed by 42 enterprises active in the animal production sector. In addition, 65 veterinarians were employed by municipalities as veterinary inspectors.

Every year the veterinary service carried out, among other activities, artificial insemination⁴ of 150,000 cows, supervised the animal health standards on about 25 dairy and cattle fattening farms (including 15 private producers and ten state farms), seven sheep farms, five pig units, two horse studs, 20 poultry production/processing units, 12 trout hatcheries, as well as 231 slaughter houses, nine dairies, 108 livestock markets, etc., in all totalling 13,000 facilities. Production and distribution of semen as well as the animal performance recording were carried out by the Animal Breeding Centre in Banja Luka.

The service also recommended the price structure of processed milk, premiums for milk (cattle, sheep and goat) production, and production of breeding stock. In addition, there were four specialized veterinarian institutions established within the framework of the University Veterinary Centre at the Veterinary Faculty of the university to carry out diagnostic examinations of contagious and parasitic diseases as well as undertake technical research in veterinary medicine. These institutes, located at Sarajevo, Tuzla, Mostar, and Banja Luka, employed 98 research veterinarians and 146 support staff.

2.3 Current Situation

2.3.1 Resource Structure

During the war the total number of farm animals has been reduced considerably. In RS the number of cattle declined by 43 percent, number of sheep by 64 percent, pigs by 46 percent, horses by 31 percent and poultry by 36 percent compared with 1991, Table 8.

Table 8: Estimated number of livestock in RS in 1997

⁴ Decision on Enforcing AI

Type	Category	No. of head	% compared to 1991
Cattle	Total	200,973	57
	Cows and pregnant heifers	150,000	56
Sheep	Total	316,712	46
	Breeding sheep	238,000	46
Pigs	Total	291,789	64
	Sows and pregnant gilts	50,000	54
Poultry	Total	2,087,183	45
Horses	Total	26,494	69

Source: RS Economic Framework Working Group Report.

Production has been reduced proportionately. The pig and poultry sectors are recovering quickly because of their more rapid breeding cycles, but cattle numbers are slow to recover because of their longer breeding cycle and producer reluctance to rear replacements in excess of maintenance needs.

2.3.2 Institutional Structure

The RS Ministry of Agriculture, Forestry and Water Management is located in Bijeljina and is very small and under-resourced. At professional level, the veterinary department has two veterinarians and a livestock husbandry specialist. The total budget is some equivalent to DM1.725 million, approximately 0.5 percent of total proposed government expenditure. There is no provision for subsidies or support for research, extension, and the activities of the agricultural institutes.

Government has retained most of the pre-war mechanisms and procedures for controlling consumer and producer prices of the main agricultural commodities. These mechanisms include:

- Floor price for milk, which is not supported by direct government intervention, has been increased to the equivalent of DM0.42/litre (3.2 percent fat) for 1998, which is DM0.5 - 0.75/litre for > 3.6 percent fat.
- Producer subsidies for milk (cow, sheep and goat), equivalent to DM0.09 /litre. This subsidy is paid initially to the dairy processor who must then pass it on to the producers. Although this subsidy has been announced for 1998, no provision has been made for it in the current budget.
- Input subsidies paid to farmers who retain or purchase young breeding stock: at current exchange rates these are equivalent to about DM250/head for heifers; DM750 /head for breeding bulls; DM83/head for breeding sows; DM166/head for breeding boars. Although this subsidy has been announced for 1998, no provision has been made for it in the current budget.
- A requirement that any price increases for “controlled” agricultural products and services be approved by the Ministry of Agriculture and then by the Institute of Prices, which is a part of the Ministry of Internal Trade and Supply. This applies to animal health remedies, animal feed, and animal health services.

These prices are approved by the Ministry of Agriculture and by the Institute of Prices. In addition, prices for animal feeds, animal health services, and parity prices for barter transactions must be approved via the Institute of Prices. However, official policy is largely irrelevant as producer prices are influenced mainly by the fall in domestic demand due to low purchasing power, lack of cash and operating capital, placing more reliance on barter transactions.

In principle the veterinary department retains its pre-war structure and mode of operation with vet stations in 50 of the 60 municipalities, some 250 veterinarians, a diagnostic laboratory in Banja Luka and seven border inspection stations. In practice, the system is barely functional. Veterinarians receive no salary and operate effectively in a private capacity, the veterinary stations and laboratories are poorly equipped and the available budgetary resources are too small to effectively monitor and enforce animal health requirements. The ministry has accepted the need to formally privatize the veterinary service but has no clear idea how this should be done, and which services to privatize.

The veterinary centre at Banja Luka continues to operate with considerably diminished resources but still maintains its storage of deep frozen semen (DFS) and provides a basic semen supply service to the cattle production sub-sector in RS. Pre-war annual DFS production levels of over 250,000 doses and disbursements in excess of 300,000 doses, had dropped to around 50,000 (30,000) in 1995. This facility has the capacity to supply the whole country with cattle semen, but needs restocking with progeny tested bulls from Europe (Simmental, Holstein, Brown Swiss).

At municipality level there is usually a small agricultural unit within the department for economic planning, which consists of three to four agricultural inspectors plus an agricultural statistician. Although these people typically have a formal, university-level training in agriculture, their work is largely focused on inspection and they have very limited contact with farmers. Salaries and expenses are funded entirely from local government taxes.

2.3.3 Profitability

Although the profitability of production was not an important consideration in the former centrally controlled socialist system of economic management, in a market-oriented system basic concepts of enterprise profit, marginality, factor efficiency and opportunity cost become more important. These and the accompanying analytical 'tools': gross margins, partial budgets, input optimization and cost: benefit analysis, become very useful for making farm management decisions about the optimum scale and intensity of farm production systems, enterprise planning as well as agricultural sector planning.

To obtain some idea of the current profitability of livestock activities in RS, the working group was asked to prepare gross margins⁵ analyses for the main types of activity: cattle, sheep, goats, pigs, poultry and fish. These are presented in Appendix II and summarized in Table 9.

Table 9: Summary of Livestock Gross Margins, DM

⁵ The gross value of production less variable costs used to achieve that production. It does not include fixed costs and is not a cost of production calculation.

Activity	Gross Income	Feed		Animal Health, Ins.	Labour & Interest on oper. capital	Repl' ments	Gross Margin per female
		Own	Purchased				
Cattle: state farm	2,908	1,411	664	80	150+100	266	237
commercial	2,429	1,413	372	65	180+53	240	106
pte farm, plains	1,965	1,378	80	65	180+18	216	28
pte farm, uplands	1,498	812	0	65	180+8	159	274
pte farm, mountain	1,148	701	0	65	150+8	159	65
fattening bullock	1,575	345	0	45	75+139	880	91
Sheep –10	1,783	1,363	0	40	180+3	160	5,7
Pigs – 5	8,700	0	6,200	282	225+390		321
Poultry (eggs)	38,000	0	23,090	300	225+990	10,000	0,34
Poultry (meat)	17,110	0	10,110	500+500	150+300	3,500	0,40

Since most of the input data used in the activity models were based on theoretical calculations, especially for the feed utilization, the results only provide an indication of potential viability under above average management conditions. Ideally these analyses should be based on actual data obtained systematically from randomly selected producers representing the different types of production systems, e.g. state sector farms, private commercial and traditional small producers.

Any strengthening of the livestock support service facilities needs to include provision for such farm input:output production data and their analysis. Not only is such information useful for on-farm management, but research and extension service administrators can use it for targeting their programmes, and agricultural sector planners need it for policy preparation and strategic planning.

2.3.4 Donor Support

Donor support in the livestock sub-sector has been slower to materialize in RS than in FBiH. However, in 1998 the EU is financing the importation of 3,450 Simmental pregnant heifers, and an IFAD/World Bank programme to bring in 2,100 heifers in 1998 followed by 1,500 in 1999 is being planned. The Salvation Army has brought in 150 heifers, while ARC is planning to import 1,000 sheep.

The EU/Phare programme in cooperation with GTZ is preparing several livestock development projects for the Una-Sana and Banja Luka areas.

III. ISSUES AND CONSTRAINTS

3.1 Rehabilitation or Development

The main issues and constraints to rapid development can be considered in two main groups:

- i. the obvious damage done by the four-year war;
- ii. barriers to development that existed before the war that were mainly associated with the centrally-controlled socially-oriented system of resource management and community development. These included:
 - direct factors resulting from the support focus on the public sector production units and discrimination against the private sector, which controlled the major part of the resource base, and;
 - the maximum-output-at-any-cost mentality imposed on the production environment, especially on its managers and administrators, that conditioned many bureaucrats to making (production) decisions under the comfortable umbrella of state subsidies and subventions, and controlled prices and profit margins, far removed from a market oriented economic environment.
 - the heavy reliance on state legislation, regulations and controls to ensure compliance with government policy and ministerial directives. This particularly applied to prices, and the animal health and veterinary services.

These latter factors are still deeply embedded in the government management structures and procedures. Consequently, many administrators are not ready to accept the radically different demands of the new more liberalized market driven environment and understandably resist its management methods and way of thinking. Herein lies the single biggest constraint to rapid development of the agricultural sector.

An important consideration in government planning now is how to deal with the inevitable conflict between achieving economic growth and satisfying social needs and demands. In effect this means achieving a balance between rehabilitating the agricultural sector to its pre-war socially-oriented structure, and pursuing a development strategy that is more consistent with a market economy and its focus on viable commercial production units rather than on small subsistence farms.

In formulating a development strategy there are several factors that need to be considered in determining the post-war policy and target cattle population:

- the change in the resource base of the Republic and the areas that will be available for ruminant utilization (summer grazing and fodder conservation) in future;
- the likely domestic demand projection for animal products and the extent to which local production and processing can compete with imports in quality and price;
- whether the Republic should merely aim for self-sufficiency, or could and should target the wider domestic market (FBiH) and the export market. Rehabilitation of the dairy processing sector will be an integral part of an export oriented strategy.

In general, present livestock production appears close to domestic demand, with the possible exception of dairy production. According to the working group, present net milk output is estimated at around 148 million litres, equivalent to about 105 litres per caput (1.4 million pop.) and 986 litres per cow. To reach domestic self-sufficiency in dairy products (est. 180 litres/caput) with a herd based on 150,000 cows, the yield per cow has to increase to 1,650 litres/cow (plus calf milk) - a 67 percent increase on current net yield. Since the Republic has the basic resources and technology to produce most livestock products in surplus to domestic needs, the main constraint to raising output would appear to be its restrictive trading practices.

3.2 War Losses

It is important to distinguish the specific and considerable impact of war damages from inherent management and structural weaknesses that existed before the war that also should be remedied as part of any rehabilitation strategy. The damage inflicted in RS as a result of the war includes a significant reduction in livestock numbers and some damage to production assets such as buildings, equipment, and processing facilities as well as the land mines embedded in the grazing resources. In addition, the support services have been disrupted, including animal health, diagnostic laboratory facilities, and the extensive breeding records. Moreover, the war and land mines have depopulated some areas.

Poultry and pig numbers and facilities have been largely restored. However, ruminant animal numbers, especially cattle, are still well below pre-war levels and under-utilization of the extensive grazing lands represents a significant loss to the economy. Of the 150,000 female cattle in RS at the end of 1997, only a minority are exotic breeds. These are principally of European origin and represent the survivors from the war. The remaining sheep and goats are remnants of the pre-war local flocks.

Because the average one or two cows per household provided a steady and reliable cash flow to families in rural areas, their loss is imposing severe financial and social burdens on the remaining rural families. Lack of milk processing capacity is still a major problem.

The immediate target therefore should be to restore processing capacity and raise the productivity of the existing cow herd, mainly by universal application of improved husbandry and management practices to ensure optimum cow performance, and then upgrading the quality of indigenous herd through mating of the indigenous herd with improved bulls/semen. Cattle numbers may be then increased to the extent of available ruminant resources and in accord with market opportunities.

The main constraints to a rapid build up of cattle numbers are:

- the low importation of replacement animals through the donor-driven import schemes, especially cattle, and the likelihood that this programme may be for a very limited period;
- a continuation of the traditional disposal of female calves;
- the poor management of smallholder dairy stock and the consequent long calving interval (15 months or more), especially to first calf;
- lack of adequate credit facilities to help finance a rehabilitation programme.

Restoration of sheep numbers is largely dependent on credit availability to enable willing sheep producers to restock their pastures. This potential for rapid rehabilitation is

favoured by the existence of unused pasture resources and the high unemployment in rural areas.

3.3 Farm Size and Fragmentation

Previous chapters have highlighted the dominance of the small farm structure of the private sector and the relative unimportance of the state sector production units, except as a source of improved breeding animals and demonstration of good (best practice) technology. Subsistence farming is thus the main production system in the Republic, compounded by the scattered and fragmented distribution of the holdings, largely because of the historical inheritance customs that divided the land among all children. The main cause of this smallholding structure is probably the high rural population pressure on a limited land resource base. The 10 ha farm size limit imposed on private farmers under the previous regime (but abolished in the early 1980s) may have exacerbated this situation by discouraging the emergence of commercial production units, especially cattle. Consequently there are very few private commercial livestock units in the country and productivity is generally low, as already explained.

Because this situation is deeply embedded in the social fabric of the country reinforced by the lack of support from the state under the previous regime, changing this pattern will take time and careful nurturing of these small farmers. However, the current reduced rural land occupancy because of depopulation during the war may provide the opportunity to enlarge farm size and encourage commercial production and use of improved technology. Removal of the 10 ha restriction has already been made law.

However, that an entrepreneurial spirit exists among rural producers is evident in the increasing number of new commercial scale production units: poultry, pigs, cattle fattening, and milk production that are developing in RS. The main limitations to this trend are the lack of credit and uncertainty about markets. An appropriate marketing network needs to be put in place to encourage surplus milk production, along with adequate support services, including extension, research, credit and animal health.

3.4 Factors affecting Productivity

As already indicated, the level of technology in the livestock sector is very variable. The state farms are generally well managed and try to employ good technology with the reduced herd size to achieve near-European levels of output – see Appendix I. Most of the animals are exotic breeds, including Simmental, Holsteins and Brown Swiss from Europe. They are constrained from reaching ideal management levels by lack of operating funds and minor war damaged buildings and inadequate equipment. Poor cash flow and high debt levels, mainly due to slow payments for milk deliveries to state-run factories, restricts operating capital and hampers an optimum level of nutrition. Moreover, concentrate feed supplies tend to be allocated to the pig and poultry sub-sectors at the expense of cattle. These factors reduce milk production and slow the growth of the young animals.

With the probable privatization of these production units, the challenge will be to maintain the productive capacity of these herds in (smaller) commercial production units, and utilize their genetic base effectively for upgrading the national herd.

As far as could be ascertained, the level of management being applied on the commercial farms is also satisfactory, but irregular cash flow for the same reasons as on the state farms also affects these producers. While maize (grain and silage) is the main feed source for RS livestock, some improvement in ruminant productivity would result from

greater use of extensive grazing of the animals in the summer. Apart from the reduced labour involved, the number of grazing months available (six to seven) is sufficient to justify a grazing based management system. Heifer rearing in particular would improve significantly on a summer grazing based regime. Rearing cost would be reduced by this strategy.

The main two barriers to the emergence of more commercial dairy farmers (three to ten cows) are the lack of a comprehensive marketing (milk collection) network and lack of accessible credit facilities. Improvements in the management of the state dairy processing facilities by their privatization would improve producer confidence considerably and provide a sound basis for the development of commercial milk production.

The constraints to improving the levels of productivity on the majority subsistence sector are immense, at least in the short term. Traditional conservative behaviour and an economic and support environment that does not enable commercial production are the two main barriers. These include lack of incentive to change, lack of education, small farm size, shortage of money, lack of markets, poor quality support services, etc. However, it is likely that given the opportunity through provision of an enabling environment some/many small farmers would be willing and able to increase the scale of their production to approach commercial size.

3.5 Support Services and Institutions

A properly functioning farming system in a market oriented economy comprises the farm family and its production resources operating at an optimum output level in a supportive environment, whose main elements consist of:

- a satisfactory price and marketing infrastructure;
- an effective research capability, including genetic improvement, farm management and animal husbandry;
- effective transfer of that technology to producers through an extension service that could be public or private;
- (for livestock) an effective animal health service complete with diagnostic and treatment facilities;
- availability of adequate credit for investment and operating costs;
- availability of inputs at reasonable prices;
- a supportive legislative environment that seeks to maintain food quality and hygiene standards without oppressing the producer.

Unless all those components are present and working effectively and cohesively, the farmer is restricted from reaching the potential productive capacity of his resources. In this early post-war period, the marketing infrastructure is still confined to serving only the areas adjacent to processing facilities in the main producing areas. The price (DM0.50/litre for 3.6 percent b. fat milk) is adequate⁶ by European standards (approx. DM0.50/litre), and well above Australian and New Zealand levels (approx. DM0.26/litre). There is negligible

⁶ This high producer price has important implications for the competitiveness of the processing industry and the wish by administrators that RS become self-sufficient in dairy products.

research activity or facilities, especially for farm management and animal husbandry. The extension service is rudimentary and is now a municipal responsibility where other sectors, especially health and education, have higher priority for very limited finances.

The animal health service exists but with reduced diagnostic support and is obliged to charge high fees to offset a very limited public budget. Credit facilities are totally inadequate and exploitative where they do exist. Inputs are not subsidized but tend to be purchased from Yugoslavia where they are cheaper; especially animal concentrate feed (20 percent less). The legislative environment, especially covering animal health and food hygiene, is still based on the operating framework of the former socialist regime and is heavily controlled by the veterinarians. This highly regulated approach to managing and administering the livestock sector is not necessarily appropriate in a market-oriented economy.

3.6 Pasture Resource Utilization

The favourable pasture and meadow resource base (620,000 ha) for ruminant production has already been highlighted: the lower altitudes for cattle and the higher mountains mainly for sheep and goats. Their exploitation is restricted by several factors, including:

- reduced ruminant animal population in the aftermath of the war;
- depopulation of the rural areas because of the war;
- lack of stock water facilities in significant areas of the (state-owned) mountain plateaux;
- unattractive life style of the sheep herder;
- lack of use of artificial fertilizer on the pastures, despite research that convincingly demonstrates potential massive increases (by 4-5 times) in dry matter production.

To these might be added the potential from exploiting the under-utilized surface water resources for irrigation of forage crops where land topography and soil quality are favourable. However, while irrigation can be used to boost forage (maize) crop production for livestock feed, it may also be used more economically for producing high value crops, possibly with export potential, that would yield a higher return per unit of water used. Likewise, the use of rainfed arable land for producing feed crops for livestock must also be questioned on economic grounds. In a market economy, the comparative (economic) advantage of land and water use becomes the major determinant of appropriate resource use rather than tradition or (politically driven) production pressure.

For these reasons, a priority element of an agricultural sector strategy is to review and develop a Republic land use plan based on optimum use of basic resources. Target non-ruminant and ruminant livestock strategies and populations would then be formulated in a more systematic way. Optimum ruminant numbers may well be determined by the pasture area rather than relying on maize grown on good arable land.

For this reason, it is difficult to estimate the optimum size of the ruminant herds/flocks that might be achieved if the pasture resource base is utilized to its optimum capacity. The appropriate utilization strategy would be based on pasture grazing in the summer months and shedded nutrition with hay, silage, and concentrates in the winter. Some research is needed to test various systems to establish the economically optimum resource and management combination in the various agro-ecological zones. Experience in other countries with similar favourable grazing resources would help this work, e.g. UK and

Germany. Because of the long winter, it is likely that the factor limiting optimum pasture utilization will be the availability and/or cost of concentrate feed⁷.

⁷ DM40 per quintal, compared to DM30-35 in Germany and Hungary.

IV. STRATEGY RESPONSES

The main livestock issues in RS include the need to improve productivity of the smallholder producers, continued encouragement and support to emerging commercial farmers, especially of cattle, pigs and poultry, retention of the genetic capacity and productivity of the herds presently managed by the state sector, and reopening market opportunities for surplus output within the country and the region.

Most of these issues and constraints are well known to RS scientists and livestock sub-sector administrators along with solutions. However, because of the mindset embedded under the previous production oriented regime and management system, the preferred solutions tend to be guided mainly by restoration of the pre-war structure and system of management, especially its preoccupation with genetic improvement as the main solution to the sector's production constraints.

In a market-oriented economy appropriate priorities and solutions are different to those that apply in a centrally controlled and protected economy. Those differences are highlighted in the following discussion, focussing on the major strategic issues only.

4.1 Improve Resource Utilization

4.1.1 Short Term Extension Packages

Low productivity because of poor animal husbandry, particularly among the mainly subsistence smallholder producers, is common knowledge among livestock sector administrators. There is also some concern that with the likely (imminent) privatization of the better performing state farms some productivity regression of those herds may occur if they revert to smallholder management. To prevent a production regression there is an urgent need to encourage greater productivity through the provision of a motivating environment, which essentially includes an effective support service. The fate of the largely exotic breeds of cattle on the state farms is also relevant as they represent the main source of genetic improvement in the country.

Livestock extension services would be the most important component initially, but research, credit, markets and inputs would need to be assured under the support services package. Simple animal husbandry and veterinary messages focussing on proper nutrition and health aimed at improving milk yield and reducing calving interval need to be delivered to the smallholders and emerging commercial farmers. To provide a sound basis for productivity increases it is also vital that male progeny from the exotic herd be retained and used for breeding, through both AI and direct mating. This should be done with some care as the small local Busa-type animals may suffer calving difficulties (dystocia), especially heifers, when mated to the larger exotic bulls, such as Holsteins.

Calf rearing methods, especially of heifers, need to be overhauled completely in the interests of more efficient and effective results. Weaning time can be reduced to seven days and the calves bucket fed with cow's milk or milk replacer until they are ready for grazing on pasture. Silage or good quality hay can be used in winter with a minimum top-up from concentrate.

Consistent with a market economy, extension messages need to have a 'profit' flavour to convince the producers that the inputs are likely to result in income (at least) double their cost. Indeed, they will only adopt any new practice when they are satisfied it is worthwhile, has low risk and is a good way of using limited resources. The messages would include

grazing management, fodder conservation methods to improve hay and silage quality, strategic use of concentrate feed, housing, calf rearing and basic animal health.

Use of AI or access to exotic bulls to improve the genetic potential of the local herd should continue to be promoted, but unless the improved progeny can be nourished to their potential, that strategy may not be worthwhile in the short term. Using legislation to force this policy may not be appropriate or necessary, as producers will upgrade their animals if they are convinced it is profitable to do so, that is when they want to produce tradeable surpluses. Since a subsistence level production system is not conducive to generating a surplus, a reliable marketing network is the catalyst to encourage increased output. This means a more comprehensive collection system and much more reliable payment to producers by processors. Milk prices (set by government) are generous by regional standards. Indeed because of the inherent conflict (over prices) between producer and processor, if the price is set too high in relation to the regional prices local dairy products cannot be manufactured competitively. However, to conform to European practice the method of determining price based on fat content only may need to be revised to include protein content. Furthermore, for statistical and analytical purposes, the European standard unit of milk is now expressed as fat corrected milk (FCM⁸).

The ideal longer-term extension structure would be municipal-based, coordinated by the Ministry that would also provide specialist technical support and guidance. Not only is it necessary to re-establish and/or strengthen the animal health and breeding services, but livestock husbandry research and advisory services also need to be set up. While donor funding could be secured to establish these services, the on-going operating costs would have to be found from the Republic/national government budgets. Given the low budgets at all levels of government coupled with higher priority of the non-agricultural basic services such as health and education, a public sector funded service is likely to be very modest for some years.

The establishment of local centres that supply an all-round service including inputs and extension is a possible option, and the processing factories could employ extension staff to encourage greater output, as is common practice in most western countries. Modest fee-for-service could be introduced gradually, although smallholder livestock owners are somewhat accustomed to paying veterinary fees they are reluctant to use this service except in an emergency because of (perceived) high fees.

Restructuring the animal health network needs more detailed study to match needs with resources, especially if donors and the government are to contribute to 100 percent of establishment and initial operating costs. Re-establishing the pre-war structure may not be appropriate now, but at the same time entity sharing of facilities will be more economical than setting up separate services. When the political environment allows more cooperation between the entities, it would be less costly and more efficient to strengthen the excellent Banja Luka cattle breeding centre so that it can supply semen for the whole country. Likewise, the diagnostic facilities need to be structured to serve the new livestock sector needs.

The animal health legislative framework also needs to be reviewed in detail to ensure it accords with the requirements of a market economy. Review by an experienced western

⁸ Equivalent to a litre of milk containing 4.0 percent b. fat.

country public sector chief veterinary officer, preferably someone with quarantine regulation experience, from the EU e.g., would be easy to arrange.

4.1.2 Longer Term Resource Development

Since pastureland is the main agricultural resource, its development for ruminant utilization is an obvious priority, the mountain pastures especially. While at present there are insufficient cattle to fully exploit a more productive grazing resource, sheep numbers could be augmented much more quickly if the credit constraint is removed. This would enable potential sheep farmers the opportunity to purchase suitable stock from countries within the region. Loans of DM20,000 would be adequate to purchase enough sheep for a viable production unit of around 200 ewes.

There are not enough data available to enable even a reasonable estimate of the potential stock carrying capacity with good management of both pastures and animals. However, it can be confidentially predicted that numbers could be substantially increased on their pre-war capacity. The main limiting factor will be the cost of concentrate feed during the long winter period, coupled with the extra investment in animal housing and fodder conservation needed to support increased cattle numbers. However, by the use of fertilizer the production of the mountain pastures could be trebled, while large increases in production are possible on the lower range pastures and meadows.

Livestock and pasture scientists working together⁹ need to develop appropriate integrated pasture utilization and stock management systems for each agro-ecological zone that optimize the use of the grazing resource in summer and provide an optimized feed resource in winter. This development would be need to be undertaken in accord with market-oriented economic principles which seek to identify the input:output relationships (in this case fertilizer, conserved and concentrate feed: milk) where profit is maximum, instead of simply aiming for (unprofitable) maximum production.

There are a number of computer models available in Europe, Australia and New Zealand, where ruminant utilization of pastures has reached a high level of efficiency that would assist this research programme. Appropriately structured study tours for selected scientists would enable an effective interface with the owners of these models to be established. Furthermore, the international dairy data collection and comparative analysis being undertaken in Germany under the International Farm Comparison Network programme would assist RS scientists to keep abreast of dairy cost and profitability trends throughout the world. Among the eastern European countries, both Hungary and Bulgaria are already linked with this centre¹⁰. The most recent dairy analysis¹¹ has shown the comparative advantage enjoyed by those countries that can maximize the use of their pasture resources.

Improved productivity on the private lands in the hilly areas and lowlands will depend on land consolidation to create favourable conditions for mechanized fodder and forage conservation, in addition to the establishment of more effective support services already discussed above.

⁹ The present linkage of pasture and forages with crops is inappropriate for obvious reasons.

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¹¹ available at <http://www.fal.de/english/institutes/bw/ifcn/html/ifcnhome.html>

4.2 Animal Productivity

The key issue in the Republic according to the working group is the low (genetic) quality of its livestock that, coupled with poor husbandry practices, has resulted in low productivity. The working group considered that importation of improved breeds and strains of breeding stock and their management on specially set up reproduction centres would overcome this constraint. Specifically they asked for 30,000 pregnant heifers for distribution to private farmers; and five pedigree bulls, 300 sows and 40 boars, 1,500 (Virtemberg) ewes and 30 rams, to be allocated to three reproduction centres. These centres would reproduce improved animals for disbursement to private farmers to upgrade their herds.

It is the opinion of the mission that while genetic improvement is important in the longer term, the more immediate problem is to raise the level of productivity of the existing stock through better nutrition and management, especially cattle.

Pig production technology as demonstrated at Nova Topola, the biggest pig production centre in the country, is already high and the genetic pool in that unit is adequate for the short to medium term. Breeding sows and boars could be sold to private (commercial) farmers as part of its normal trading function. Privatization of that state farm will need to be managed to ensure its level of technology and breeding stock is not lowered. This could be achieved by retaining the whole unit in a single business entity, sub-dividing it into several smaller units using the same facilities, or sub-division of the herd and disbursement to smaller commercial producers, e.g. ten to twenty sow units. It would be necessary to select experienced managers interested in commercial production to ensure the stock are not returned to a (low productivity) subsistence environment.

Poultry production has largely recovered from the war damages and a significant high technology private commercial sector is already in place. Its further expansion is limited by restrictions on regional market opportunities, especially within the country.

Sheep development has been discussed in the previous section and is largely associated with pasture resource exploitation and availability of credit. In the longer term genetic improvement may increase output from this sub-sector, but this should be undertaken under the control of animal geneticists, as past attempts in introducing exotic breeds of sheep have not been very successful.

Cattle numbers are adequate for the domestic market but need to be better managed to increase output. Genetic improvement will help to lift the potential production from the herd, but only if the animals are feed and cared for properly. Since farmers cannot be coerced into managing their animals better they need to be provided with a motivating environment, the main elements of which include market, inputs, credit, support services such as a reliable cheap animal health facility, and appropriate technology.

They will intensify production if they are convinced it is profitable to do so. As the basic elements for profitable production in the dairy sub-sector already exist – adequate prices and a favourable cost structure – the extension messages and packages need to be formulated in terms of profit potential. It may be more appropriate to consider establishing with donor help a modest training programme for livestock producers that would focus on simple animal husbandry practices, including nutrition, health, calf rearing, housing and fodder conservation. Experienced commercial farmers could be used as focal farmers at selected locations throughout the Republic for this programme.

The import of progeny tested bulls for the Banja Luka cattle breeding centre when political conditions allow its coverage of the whole country is essential to maintain the

quality of its service. These animals would be supplemented by selected progeny tested animals from within the country with the re-establishment of a comprehensive recording system in FBiH and RS.

4.3 Institutional Support

Because institutional support structures are being covered in depth in another annex, only the main points as they affect the livestock sector need be covered here. Several have already been discussed in other sections, e.g. extension and animal health, and a production recording facility is discussed in 4.4.

A major constraint to the effectiveness of the support service network is the lack of understanding and practical application of market-oriented farm management and business skills at all levels of government. As already explained, the economics and planning processes of a market economy are different and generally not appropriate for those of a production driven economy. Training programmes in market economics are essential for all personnel likely to be giving advice, involved with planning, research, and providing credit. At the same time, the agricultural economics curricula at the universities need to be aligned to these methods.

Farm production and profitability data are an essential ingredient to evaluating and monitoring the economic health of the agriculture sector. In a market economy it is necessary to collect and analyse both physical and economic/financial information from representative producers on a regular basis. The data collection needs to be comprehensive covering the range of production sizes, types and in the various agro-ecological zones. This task could be undertaken by the universities, an agricultural research institute, or by an expanded statistics facility. There are models of appropriate farm management data collection and analysis structures in the region. It can be initiated on a modest scale in accord with budgetary limitations and expanded as funding permits. The data would be used for statistical purposes as well as for undertaking a range of analyses including simple gross margins, establishing minimum enterprise size for commercial viability, prioritizing research, etc.

The mission believes there is a need to undertake adaptive livestock husbandry research in the country for use by each entity. One of its first tasks would be to develop practical grazing-based management systems to optimize the use of the pasture resources. However, because the number of livestock is relatively small together with the fiscal restrictions, it may not be practical to set up a separate research facility in each entity. If a national facility is not possible for political reasons, it could be established as part of a breeding centre at one of the state farms, and could become the coordination centre for the extension service.

4.4 Breeding and Recording

Increasing production through improving the genetic capability of the herd is an important measure that should continue. However, until the existing herd is nourished to its economic potential, there is little point in raising the genetic quality beyond the reach of producers' management. Nonetheless, it is important that in the medium to longer term genetic development be consolidated in RS and/or BiH to identify the high-producing animals and provide a mechanism for using them for breeding. In particular, upgrading the local breed by use of exotic bloodlines needs to continue. This could be by AI coordinated

from Banja Luka, and by distribution of bulls to areas not readily covered by the AI service and as a 'live' back up to the AI at village level.

Establishment of one or more breeding centres for the production of pedigree animals was recommended by the working group, along with the re-establishment of the production recording scheme, especially for the exotic herd. Herd registration and recording facilities existing in other countries¹² could be used to help re-establish the dairy recording system in RS.

4.5 Production Structure

The dominance of subsistence scale and unconsolidated production units and the need to promote more commercial-sized units is not disputed. Not only is this structure relatively unproductive, but it is difficult to service. This issue concerns the strategy for privatizing the 'social' sector farms (cattle and pigs) as well as for the transition of at least some of smallholders into commercial, surplus producing units. In privatizing the state farms the first step would be to establish the appropriate land use for the farm, i.e. whether suited to crop or livestock. The livestock either should be retained in commercial sized units (minimum of ten cattle and 20 sows) on the same land, or disbursed in commercial scale lots to commercially oriented producers supported by a credit package. They could also form the nucleus of strategically located demonstration herds as part of a livestock management training network.

The reduced rural population, high numbers of displaced persons and high unemployment provides a good opportunity for restructuring of farm size and consolidation of scattered lands. The mission believes the catalyst for this is the expansion of a marketing network, coupled with availability of animals and related support services. These services, especially extension, would then be focussed efficiently on this group, who would be motivated to respond and could afford the fees required to provide this service. This process has already started but needs additional support.

The unreliable payments from the state-owned processors is a powerful disincentive to commercial production and so needs to be addressed as part of the package of support. Training of managers in market-oriented business management skills and proper administration procedures and customer relations is urgently needed to solve this critical bottleneck. An adequate credit framework would also help processors to manage their finances more equitably.

¹² Eg, the Agricultural Business Research Institute located at the University of New England, Armidale, NSW, Australia, operates one of the most comprehensive livestock registration and recording schemes in the world.

V. DEVELOPMENT PRIORITIES AND DONOR SUPPORT

In summary, the market-oriented strategy package for the livestock sector would comprise the following elements, some of which require action by government, others need to be catalysed by donors:

1. Commercial pig and dairy production sector has to be strengthened to secure product supplies for urban areas and prevent production regression with the privatization of state farms. This would be based on the exotic animals whose disbursement to the subsistence farmers should be avoided at all cost, and retained in (small) commercial production units. Male progeny would be retained and used for crossing with the local female animals – by AI and live.
2. De-restricting access to the livestock product deficit parts of the country is essential to allow expansion of the pig, poultry and dairy sub-sectors.
3. To increase the rate of upgrading of local Busa-type cattle, the limited donor-sponsored cattle imports might include males as well as females. Selected pedigree animals would be allocated to the Banja Luka AI breeding centre and the remainder used for mating to local cattle, being careful to avoid dystocia problems.
4. An effective support service structure needs to be put in place to increase production and productivity. Its essential elements would include animal husbandry extension, animal health and veterinary services, husbandry research, credit, marketing network, reliable payment for milk deliveries. To have the required impact, all these services need to be in place and effective. Training in market economic principles and practice would be an essential pre-requisite for all professional personnel. Donors could assist in this training programme at both in-service and university levels.
 - The extension service would be fee based and concentrate in the short to medium term on the emerging commercial/surplus producers.
 - Tailoring of the animal health and veterinary services to expected needs requires further detailed study to ensure it conforms with a market economy, particularly the legislative framework, and is within the budgetary limits of the state.
 - State processing industry needs to be privatized, re-equipped, financed and management levels improved, see separate report.
 - The credit facilities need to be completely overhauled and made effective. This matter is discussed at length in a separate report;
 - A livestock research institute should be set up with responsibility for animal husbandry, pasture and forages, animal selection and breeding, and production recording, and possibly including animal health diagnosis facilities. Donors could assist with this investment.
 - Seek integrated utilization of the existing country's institutional structures.
5. Develop appropriate grazing-based ruminant management systems for the various agro-ecological pasture and meadowland zones. Optimum summer

supplementary and winter feeding regimes (grazing, conserved fodder, maize grain and silage) for most profitable production need to be formulated for ruminants.

6. Facilitate commercial production by encouraging expansion and consolidation of farm holdings;.
7. Set up a modest farm data collection and analysis facility in an appropriate institution, ideally in collaboration with FBiH.

EUROPEAN LIVESTOCK PERFORMANCE BENCHMARK INDICATORS

Livestock	Indicator	Performance
Dairy Cattle	Milk yield per cow Stocking rate, cows /ha Calving interval (index) Calf weaning age Milk composition (Holstein)	5,500 – 8,500 litres FCM 0.9 – 3.6 385 days 7 – 10 days b. fat 3.85%; protein 3.15%;
Sheep: Meat Milk	Lambing Milk yield per ewe	145% 150 – 300 l.
Goats: milk kids	Milk yield Prolificacy	500 – 900 l. 140-180%
Pigs:	Weaners/sow/year FCR, fattening to 92Kg Fattening time, 25 kg to 92.5 kg	21 2.6 kg feed per kg l.wt gain 16 weeks
Poultry: eggs broilers	52 week laying, per hen 46 day weight	273 – 292 2.23 kg
Fish: Trout	10 months feeding	300 g

Cattle Activity: per head
Type of Production: Fattening bullock, 450 kg

Parameter	Units	Quantity	Price/unit DM	Value
Income:				
Sale	kg	450	3.50	1,575
Sub-total				1,575
Variable Costs:				
Input weight	kg	220	4.00	880
Own feed: cereals		150 x 5=750	0.40	300
silage		150 x 6=900	0.05	45
Health: medications	head			20
Other services, veterinary, etc.	head			25
Hired labour (40 head/worker)	man days			
Family labour	man days	5	15	75
Interest on operating costs 12%				139
Sub-total, variable costs				1,484
Gross margin, bullock				91

Activity: Sheep
Type of Production: Sheep milk
Sheep per ha: 10

Parameter	Units	Quantity	Price/unit DM	Value
Income:				
Milk produced	litre	40 x 10=400	1.00	400
Sale of progeny	kg	25 x 10=250	5.00	1,250
Sale of wool	kg	1.5 x 10=15	0.50	7.5
Sale of culls (pro-rated)	kg	50	2.5	125
Sub-total				1,782 .5
Variable Costs:				
Own feed: cereals	kg	90 x 0,5 x 10=450	0.30	135
hay	kg	183 x 1,5 x 10=2,740	0.20	548
milk-(for calves)	kg	90 x 0,25 x 10=225	1.00	225
green cut	kg	182 x 5 x 10=9,100	0.05	455
Health:				
Medications	head			20
Other services, veterinary, etc.	head			20
Hired labour	man days			
Family labour + shearing	man days	12	15	180
Replacements,	hd	40	4.00	160
Interest on operating costs, 12%				3
Sub-total, variable costs				1,726
Gross margin /10 sheep				56.5
Gross margin /ha				56.5

Activity: pigs
Type of Production: pigs, 25 kg live weight
Model: 5 sows

Parameter	Units	Quantity	Price/unit DM	Value
Income:				
Sale of weaners, 87	kg	2,175	4.00	8,700
Sub total				8,700
Variable costs:				
Purchased feed: - for sows	kg	6,250	0.56	3,500
- pigs	kg	4,500	0.60	2,700
Health, treatment and insemination	per head	-	3.25	282
Hired labour	man day			
Family labour	man day	15	15	225
Interest on operating costs 12% per 6 months				390
Sub-total, variable costs				7,097
Gross margin /5 sows				1,603

Activity: poultry
Type of Production: broilers
Model: 5,000 chickens

Parameter	Units	Quantity	Price/unit DM	Value
Income: Fattening chickens – live weight	kg	8,100	2.10	17,010
Sub-total				17,010
Variable costs:				
Day-old chicken	head	5,000	0.70	3,500
Purchased feed - concentrate	kg	16,850	0.60	10,110
Veterinary service				500
Insurance				500
Hired labour	man days			
Family labour	man days	10	15	150
Interest on operating costs 12% per 2 months				300
Sub-total, variable costs				15,060
Gross margin /5,000 head				1,950

Activity: Poultry
Type of Production: egg production
Model: 1,000 laying hens

Parameter	Units	Quantity	Price/unit DM	Value
Income:				
Consumable eggs	pcs	292,000	0.11	32,120
Sale of cull hens	head	980	6.00	5,880
Sub-total				38,000
Variable costs:				
purchase of young hens	head	1,000	10	10,000
Feed: concentrate	kg	43,800	0.55	23,090
Veterinary services	head	1,000	0.30	300
Hired labour	man days			
Family labour	man days	15	15	225
Interest on operating costs 12% per 3 months				990
Sub-total, variable costs				34,605
Gross margin /1,000 laying hen				3,395