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New alternatives in the environmental friendly animal production in Hungary

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ABSTRACT

Authors summarise the main general features to be considered in restructuring animal production in an environmental friendly way, in Hungary dealing with the feed production, feed and water efficiency of animals used per unit product, animal welfare related controversies regarding resource efficiency and product safety, and aspects of global and regional competitiveness in the various animal production sectors. The role of ruminants is discussed as playing a significant role in restoring the sustainability of Hungarian agriculture, increasing environmental friendliness of both plant and animal production.
(Keywords: new alternatives, environmental friendly animal production, grassland utilisation, Hungary)

INTRODUCTION

Those countries known as highly developed agriculture economies have a special characteristic insofar, that both plant and animal agriculture are well developed. Without a strong and viable animal production sector it is not possible to maintain a sustainable agricultural production, it is difficult to ensure the necessary added value contribution to the national economy. At the same time sustainability by its complex nature (*Olesen et al*., 2000) involves production chains and procedures applied which must fulfill the requirements of environmental friendliness.

The present situation of the hungarian animal agricultural sector is unprecedented in the past century. All statistical data analized, show clearly that during all peaceful periods of the 20th century (1911, 1938, 1985) the animal population of Hungary was over 3.2 million animal units (an animal of 500 kg liveweight equivalent).

Since 1990 till 1995-1996 the total animal population dropped to 1.6-1.7 million animal units, without significant increases till the present time. The dramatic reduction of the animal stocks, mainly cattle, pigs and sheep is completely atipical in our modern agricultural history, and poses a great threat for the future to maintain a sustainable agricultural production sector (*Horn*, 1997, 2000).

SOME MAIN GENERAL FEATURES TO BE CONSIDERED IN RESTRUCTURING ANIMAL PRODUCTION IN AN ENVIRONMENTAL FRIENDLY WAY

It can be stated that the environmental pressure caused by animal production in Hungary is far less as in most advanced EU countries, playing also a decisive role on the export

markets within and outside Europe. This factor gives us a great flexibility in developmental strategies.

In designing future developmental programs in animal production we have to consider some fundamental conditions enhancing environmental friendliness and sustainability.

- In both quantitative and qualitative developmental programs of animal production domestic feed production should cover the great majority of the animal feeds required. Importation of feed components of smaller volume is acceptable (protein rich feeds, amino acids, probiotics, enzimes, vitamins etc). In those countries where animal production is based on significant feed imports, the manure and slurry produced in situ, poses extremely high environmental pressure as have been shown by de *Boer et al.* (1997) for the Netherlands explicitly for the macro elements N, P and K, leading to unsustainable production systems. In *Table 1* a calculation is presented published by *Olesen et al.* (2000) showing the main data regarding an environmentally acceptable, sustainable pig production in the Netherlands. Both alternatives represent significantly reduced pig output compared to the present situation.

Table 1

Sustainable pork production parameters for the Netherlands

Denomination	Parameters
Agricultural land available for feed production (ha)	285.000
Total N produced annually (million kg)	53.62
Total N need of a pig (fattening + repr.) (kg)	8.25
Manure production of a fattening pig (kg)	5.67
Fattening based on domestic feed production, sustainable pig production 6.42 million slaughter pigs/year	
Maximal sustainable pig production based on N equilibrium 9.45 million slaughter pigs/year	

Based on data published by Olesen et al., 2000

- In most countries it can be assumed with great probability that both feeds and water prices will rise in the future, therefore in all those branches of animal agriculture which have to produce great volumes of animal products in good quality (milk, table eggs, poultry and pig meat) only breeds and technological systems should be used and applied which enable us to produce a unit of product from the least amount of feed (economic optimum) and water. Better feed conversion correlates with better water conversion, both lead to reduced manure, slurry and waste water output too, thus reducing the pressure on the environment per unit product produced, contributing to improved sustainability.

  How much impact genetic improvement exerts on feedstuffs saved and manure produced in the poultry meat production is shown in *Table 2*, based on *Shalev* and *Pasternaks* (2000) calculations.

Table 2

The effect of genetic improvement per annum on feed saved and on the reduction of manure output in the poultry meat production

Denomination	Chicken broiler	Turkey	Water fowl
World production (million tons)	51.7	4.7	2.7
Population sizes (million)	22876	306	625
Annual genetic gain in live weight (%)	2.01	2.56	4.32
Feed quantity saved (1000 tons)	1113	349	258
Reduction in manure output (1000 tons)	1292	402	297
Reduction in N load (1000 tons)	23.3	7.2	5.3
Reduction in P_2O_5 load (1000 tons)	14.2	4.4	3.3
Reduction in K_2O load (1000 tons)	8.4	2.6	1.9

Based on data of Shalev and Pasternak (2000)

Annual genetic gains reduce feed consumption by 1.720.000 tons, and reduce manure output by 1.991.000 tons on a world wide basis in the poultry meat production sector. Both efficiency improving indicators contribute to environmental safety and thus enhancing sustainability.

- A certain controversy and new challenges are facing those engaged in animal production in Hungary as EU animal welfare regulations require changes in managemental-technological systems mostly affecting the pig and even more so the poultry production sector. The dilemma seems to be the greatest in egg production, as most producers use battery cages, applying relatively high density cages with small group sizes. In most EU countries where so called alternative systems of egg production and meat chicken production are already used more extensively, more and more informations are known, most of them reporting higher mortality, new health problems in the flocks (increased parasitic incidences, cannibalism etc). Litter and partly free range managemental more extensive systems are associated with lower feed and water efficiency, increased environmental pressures. Recently both in the egg and broiler meat production increased incidence of risk factors occur endangering the general aspirations to match the more and more strict food safety regulations. In the next future the so called animal welfare oriented technological-managemental systems in poultry production have to be examined more carefully from the aspects of food safety and also on their direct and indirect effects on the health of the people working with the flocks.

  It seems however very probable that under more extensive managemental conditions in poultry meat production new genotypes have to be developed, and the much better environmental adaptability of the female sex compared to males will become of great practical importance, as the sex x nutritional and sex x rearing environmental interactions are of great significance in growth and meat traits and also in viability (*Horn*, 2001) both in turkeys and broiler chicken. Under more extensive nutritional and rearing conditions the females of the presently used commercial broiler and turkey breeds can express their inherent growth and meat producing potential significantly better compared to males.
- We think a fairly clear distinction has to be made between the various branches of animal production in that respect, how much pressure globalisation, or "regionalisation" including only the EU and neighbouring countries will put on production.

The most severe competitive pressure has to be faced in the pork, broiler chicken, and turkey production, strong "regional" competition in the milk and table egg, partly so in beef and mutton production.

In all the previously mentioned branches of animal agriculture the main "border conditions" outlined previously have to be considered seriously in planning future strategies. Much more freedom – due to less globalized competitive pressures – in choosing breeds, feeding and managemental technologies to be applied will be practicable in waterfowl, rabbit, horse, game animal, and fresh water fish breeding and production.

Special market niches and ecological conditions will allow also to develop or maintain specific breed x managemental combinations in beef, mutton even pig, chicken or turkey production. It should be considered however that even small specific market niches require not only a stable high quality, but a stable continous supply too. High quality means also sufficient quantity.

ROLE OF RUMINANTS IN AN ENVIRONMENT FRIENDLY ANIMAL PRODUCTION

Considering the special nutrient requirements and physiological characteristics of ruminants consuming mainly roughage type biomass, and producing a relatively large quantity of manure, their role is important to preserve an ecological balance, and to maintain a sustainable agricultural production.

Naturally to ensure environmental friendliness and sustainability of production animal density has to be kept within strict limits considering eco-geographical and environmental conditions.

In Hungary cattle is the dominating species among ruminants. International statistical data indicate, that the proportion among ruminants cattle are predominant where grasslands are abundant serving as main feed source. This typical situation is characterising countries or regions where human population density, is low, pastureland dominates. These countries play a decisive role in beef production (*Table 3*).

In Western Europe, mostly highly populated, housing of cattle is typical, and the cattle population per unit of agricultural area is high. Under those conditions to maintain the environment friendly character of cattle production needs large efforts to be successful. Major rule to be considered is, to limit the number of animals kept per unit area to prevent overloading the environment.

Hungary is transitional between the types, it is closer to overseas countries regarding cattle density. The available grassland area, the special features of arable crop production (grain and corn-belt type area) would enable us to maintain a significantly higher cattle population easily without any danger of jeopardising environmental safety or sustainability. Despite these obvious facts, - due to the great decreases in ruminant animal populations during the last decades the utilisation of our grasslands decreased by 50% (*Table 4*).

As the non-utilised grassland increased, deterioration of the environmental condition increased (erosion, unfavourable changes in plant species composition, increased wheed surfaces etc). To maintain grassland biotopes in healthy condition repopulation of those areas by grazing species is unavoidable in the future, to increase environment quality by an environment friendly animal production. In this respect not only cattle and sheep, but also meat type horse and farmed deer species may have to play a significant role (*Table 5*).

Table 3

The characteristics related to the cattle breeding in some Central European Western Eruropean and Overseas countries

Country	Acreage in 1000 km^2	Density of population (person/100 ha of agricultural area)	The percentage of grassland to the total area	Density of cattle population in 100 ha grassland	Percentage of beef cattle
Hungary	93	168	13,5	67	5
Poland	312	206	13,4	194	3
Bohemia	78	241	11,0	125	8
Slovakia	49	218	12,0	116	9
Rumania	238	252	19,2	69	2
Denmark	43	193	14,0	322	7
Great Britain	40	343	47,1	102	37
France	244	192	23,8	154	34
The Netherlands	551	770	35,5	321	1
Germany	357	471	21,1	212	9
Italy	301	365	17,2	136	21
USA	9.363	61	26,8	12	76
Canada	9.970	39	2,6	49	66
Argentína	2.780	20	52,0	35	83
Brazília	8.512	65	20,1	89	68
South Africa	1.221	42	65,5	13	86
Australia	7.741	4	59,3	6	71

International Statistical Yearbook, KSH, 1998

Table 4

Change of ruminant livestock and utilization of grassland

Denomination	1935	1950	1960	1970	1980	1990	2000
Grassland, 1000 ha	1.615	1.475	1.438	1.281	1.294	1.190	1.148
From that:							
hervested, %	40	40	40	35	33	30	27
grazded, %	60	60	45	30	35	30	28
unitilized, %	0	-	15	35	32	40	45
Ruminant livestock unit							
Cattle (unit)	1.507	1.777	1.577	1.546	1.534	1.571	868
Sheep (unit)	103	74	169	215	219	128	89
Ruminants (unit)	1.612	1.852	1.746	1.761	1.753	1.699	957
Change compared to 1950		100	94	95	94	91	51

Table 5

Possiblities in the trend and measure in the development of grassland based animal production

Denomination	2000	2005 (expected)	2010 (expected)	Dimension of change
Ewe population				
Number (thousand)	965	1200	1600	+535
Grass requirement (thousand ha)	250	400	700	+450
Beef cattle				
Number (thousand)	25	130	230	+205
Grass requirement (thousand ha)	30	200	400	+370
Growing cattle Hefer replacement				
Number, (thousand)	180	230	320	+140
Grass requirement (thousand ha)	110	140	200	+90
Dual purpose cattle (Hungarian Simental)				
Number (thousand)	70*	50	50	-20
Grass requirement (thousand ha)	50	50	50	0
Alternative grass utilizating species (meat horse, deer, goat etc.)				
Number (thousand)	10	20	40	+30
Grass requirement (thousand ha)	10	20	40	+30
Grass requirements of grazing live stock (thousand ha)	450	810	1390	+940
Hay requirement of non grazing animals (sport horse, dairy cow) (thousand ha)	200	200	200	0
Utilization of grassland, %	55	65	80	+25

**One part of animal keepers will give up milking and change for beef cattle*

Unfortunately present agricultural supporting schemes do not enhance developments in the previously mentioned directions, and they will probably not coincide with possible quota systems under negotiations with the EU.

In cattle production a healthy process took place in the last decade, as liquid manure almost totally disappeared from cattle farms. More than 80% of cattle is untied in resting boxes, more and more deep litter is predominating. In these straw based managemental systems, manure handling is environment friendly. The large grainland areas lead to “straw richness”.

To increase the ruminant population would be also beneficial because of their larger high quality manure output. Present calculations show that for a healthy, sustainable and environment safe arable crop production, we would need 5-6 times as much good quality organic manure compared to the amount we at present produce and use. On the other hand at present we utilise only 20% of the grain straw and corn stalk as litter for cattle and other livestock (*Table 6*). A new equilibrium is needed in the future.

Table 6

Relation between the number of ruminants and plant poruduction

Denomination	Area (million ha)	Seed crop (million ton)	Straw/stalk (million ton)	Manure required for arable crops (million ton)
Arable land	4.5			45
Grain	1.6	6.6	6	
Corn	1.2	7.8	25	
Requierement of ruminants (litter)			1.2	
Corn stalk consumption of beef cattle			0.03	
Manure production of ruminants				6

Model calculation based on data provided by the Hungarian Statistical Office, 2001

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