RECENT DEVELOPMENTS AFFECTING THE EUROPEAN ANIMAL PRODUCTION. NEW EUROPEAN MODEL OF ANIMAL PRODUCTION.

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Summary.

Animal nutrition in the European Union (EU) has been affected by several crisis, such as the mad cow scandal (BSE), meat hormones, dioxin contamination, Genetically Modified Organisms (GMOs) and the concern about the use of antibiotics as performance enhancers.

Since the nineteen seventies, animal production in EU has been under legal regulations aimed to enhance its safety and efficacy. However, during the last five years, issues such as BSE and others have put the sector in the news and, which in turn have broken the consumer's confidence on meat consumption.

This presentation will try to explain why and how the EU is dealing with the current subjects and also what the sector is doing today in order to recover the consumer's confidence. The intention is to answer some questions which today are worrying the sector, such as: Is European animal production less safe than others? Why the safety legal regulations for animal nutrition are more demanding than those for humans? The sector is also wondering if the current opportunity (crisis) may produce a new model of European animal production. Finally, the current farming policy will be discussed: from quantity to quality.

Loss of consumer confidence by:

1.- Steroid hormones. Great dispute between USA and EU (1985-2000).

When beef cattle receive growth–promoting hormones, they reach the market weight with less feed. Most of the high-yield producers have used hormones for the past 50 years. The U.S. Food and Drug Administration approved five of these hormones more than 25 years ago. In the early 1980, the EC's Laming Commission confirmed them as posing no danger to consumers (Laming 1986). In 1999, the Codex Alimentarius (scientific referee for the World trade Organisation) approved them.

However, the EU has banned the consumption of meat of animals raised with these hormones since 1985, since it was considered that they were dangerous to consumers. EU banned imports of any meat produced with the aid of hormones. This was a confirmation of the need to protect EU consumers, and also a trade barrier. The WTO complained against the EU for violating the meat trade agreements.

Recently (1995-1999), the EU has reacted on the urgent WTO demands to lift the hormone ban. The EU reacted to the concern of the WTO Appellate Body's, with a risk assessment produced by the Scientific Committee of Veterinary measures relating to Public Health (SCVPH) delivered in April 1999 (See: http://europa.eu.int/comm/dgs/health_consumer/library/press/press57_en.html). The opinion concluded that for all six hormones, that effects on the endocrine system, development, inmunological responses, neurological, inmunotoxic and carcinogenic could pose a risk. For 17β Oestradiol the SCVPH concludes that there is a substantial body of evidence suggesting that it have to be considered carcinogen, but it was not possible to quantify the risk. For the other five hormones the information is not complete and does not allow estimating the risk. The main conclusion was that no acceptable daily intake (ADI) could be established for any of the six hormones evaluated.

Therefore, in light of the opinion of the SCVPH, the Commission proposes to definitively ban the use of 17β Oestradiol and its ester-like derivatives in farm animals and to allow only its administration to non-farm animals for therapeutic purposes. The need for further information has been identified for the other five hormones (tetosterone, progesterone, trenbolone acetate, zeranol and melengestrol acetate). Therefore the commission proposes to provisionally continue the prohibition on these five hormones until more complete scientific information is available. The use of some of these substances may, however, continue to be authorised for therapeutic purposes and zootechnical under conditions of Council Directive 96/22/EC.

In conclusion, European beef meat is not produced with hormones, assuming that farmers do not obtain beef growth hormones in the black market. The European authorities at any country level are strongly determined to keep these safety regulations in order to prevent any risk for the consumers especially in the case of the susceptible prepubertal children group.

2.-BSE scandal (1986-2000).

Bovine spongiform encephalopathy (BSE) is a disease of the brain of the cow. It was diagnosed in the UK in 1986. It reached epidemic proportions due to the inclusion in cattle and cow feed of meat and bone meal produced from animal carcasses. The most general information on BSE related to public protection is presented in http: //europa.eu.int/comm/food/fs/bse/bse20_en.html.

According to Taylor (2000), the transmissible degenerative encephalopathies (TDEs) constitute a distinct group of neurological diseases of animals and humans that are caused by unconventional but incompletely –characterised agents. But the agent of BSE is a prion that is present in certain tissues of infected cows and is named specific risk materials (SRM). Mainly eating meat bone meal (MBM) through the feed spreads the transmission. The agent of BSE "prion" is a small protein highly resistant to high temperatures, it means that the current rendering system cannot eradicate this type of protein.

The real concern about the disease came when more than 25,000 mad cows per year were found in UK between 91 and 94. The worst was the identification of more than 80 person affected by the variant Creutzfeldt-Jacob Disease (vCJD) in UK at an average of 10-15 cases a year since 1994 (Brown et al 2001).

The geographical BSE risk (GBR) following Kreysa 2000 is based on the idea that BSE is transmitted via contaminated feed (other possible routes of infection are ignored). Therefore the model of the BSE –cattle system is dominated by one central feed back loop where the imported MBM and infected animals are the external challenge. In the other hand, the stability is fixed by avoiding the BSE agent via the feed chain. A stable system would eliminate BSE over time; an unstable one would amplify it. Then the most important stability factors are feeding, rendering, Fate of SRM and fallen stock. In addition today the European surveillance on BSE is based on the GBR levels and the current status is presented in table 1.

Table 1. Overview of the GBR –assessment on several countries (December 2000).

Member states EU	GBR-level *	Increasing, Decreasing, Constant GBR
UK	IV	D
PT	IV	D
SP	III	D
FR	III	D
AT	II	D
DE	III	C
BE	III	C
NL	III	D
FIN	II	D
SW	II	D
IT	III	D
IRE	III	D
DK	III	D
LUX	III	C
Third countries		
ARG	I	C
AU	I	C
CAN	II	C
USA	II	C
BRA	I	C

- *: I: highly unlikely; II: Unlikely but not excluded; III: Likely, but not confirmed, or confirmed, at lower level; IV: Confirmed, at higher level
- Source Kreysa , J., 2000.

BSE caused a large number of strong regulations on animal nutrition within Europe Union members such as the ban of use of MBM and other animal proteins for animal feeding. The consequences have changed many processes in the feed industry and consequently have introduced some additional questions. Since January 2000, the MBM

cannot be used; vegetable materials must substitute it. Part of the substitution would be from domestic origin and some would come from imports. The European soybean meal production covered is 4 % of the European requirements and 78 % of this is used by the animal nutrition. Therefore, the ban causes an impact on the supply of protein for pigs, poultry and fish. According to the regulators all of these problems are caused by the risk of cross contamination. For instance, today it is not permitted to produce ruminant feed if the same feed plant produces non-ruminant feed containing fishmeal.

Another consequence is that plasma is not permitted today although blood does not posed risk of TSE transmission (Budka 2000).

3.- The ban of antibiotics as growth promoters in animal feeding in EU (1997-2000).

Animal nutrition in the EU has been affected by the safeguard clauses generated by countries that are against the use of antimicrobials as performance enhancers since 1997. It must be remembered that in 1986 the Swedish government banned antimicrobial growth promoters. Antibiotics and chemo-therapeuticals could only be incorporated in animal feed for alleviating or curing disease, not for growth or yield promoting purposes.

When Sweden joined the EU in 1995, the treaty of adhesion to the EU allowed this country not to use AMGP for a period of four years, until the end of 1998. During this period of time, other Member States of the EU (Denmark, Germany; Finland) used several safeguard clauses against certain antibiotic (such as Avoparcin, Tylosin, Spiramycin and Virginiamaycin), which were authorised for use in animal nutrition for growth promotion purpose as feed additive.

The Scientific Committee for Animal Nutrition (SCAN) was consulted on clauses of safeguard. The opinions of SCAN can be found on the Internet at http://europa.eu.int/comm/food/fs/sc/scan/outcome_en.html. Finally, the EU Commission banned the use of Avoparcin in animal nutrition in 1997 and the EU Council of Ministers suspended the authorisation of Tylosin phosphate, Spiramycin, Bacitracin Zinc, and Virginiamycin as feed additives at the end of 1998. During the same period of time, this cross-sectorial question of resistance to antimicrobials was addressed by the Scientific Steering Committee (SSC) of the European Commission. Its opinion on antimicrobial resistance was published in 1999 and is available at http://europa.eu.int/comm/food/fs/sc/ssc/out50_en.html.

The SSC considered four ecological compartments for the transfer of resistance to antimicrobials: humans, animals, plants and soil/water. The common factors among the four ecological compartments are antimicrobials, bacteria and the genes that code the resistance. The SSC has recommended several actions, which are carefully considered at the European level. One of these actions is to monitor the resistance and in this regard Denmark has published the results of annual surveillance study on the consumption of antimicrobial agents and occurrence of resistance in bacteria from animals, food and humans since 1997. From this data it can be concluded that

reductions in the use of antibiotics as feed additives decrease the incidence of resistance (See: www.svs.dk, DANMAP 2000). The Danish report concludes that the *Enterococcus faecium* resistance to Avoparcin, Virginiamycin and macrolides decreased during the last three year in broilers and pigs since the ban.

Advantage and disadvantages of the antibiotic ban are discussed today. The ban should be interpreted as an improvement in the perception of the consumers regarding the use of products of animal origin. The prohibition will build on a new strategy, which will be closer to the "green trend" and the current ecological political movement. The disadvantages of the ban are the marked increment of cost of control of subclinical diseases. According to Jongbloed (1998), the ban of AMGP will reduce the efficacy of feed utilisation in the Netherlands between 3 and 8 per cent. On farms, where the standards of hygiene and management are often not as high, the effect of AMGP ban is even greater. According to other studies, the ban will affect mainly piglet and broiler production, while laying hens and pigs in the growing and fattening period will be less sensitive. Hedegaard (2000) indicated that the exclusion of AMGP in feeds in Denmark has resulted in an increased use of antibiotics for treatment of piglets after weaning.

In the same context, the Danish Poultry Council statistical report, which include almost all of the commercial flocks in 1998, concluded that "the mean feed consumption at 42 days of age increased from 1.78 Kg feed before the ban to 1.82 per kg of live bird after the ban and remained higher than 1.81 Kg". (see www.svs.dk, DANMAP, 1998). Also it was found and increase in the number of flocks suffering from diseases related to *Clostridium perfringens*.

4.- New millenium and Genetically Modified Organism (GMO) (1996-2000).

According to Stefan Marcinowski, genetic engineering, is the youngest branch of biotechnology. It supplements and expands the potentials available for breeding and producing high quality and robust crop plants. By selective transfer of individual genes, today it is already possible to produce plants that are resistant to certain herbicides, or that can repel insects themselves. Also, the progress on genetically modified plants is intended to produce higher nutritive and feed value and improved cultivation properties, such as enhanced tolerance to drought or salt -rich soils.

Since 1996, the cultivation of transgenic varieties of soya, cotton and corn products in the USA, for instance, has increased five times. Today, 50 % of soya and cotton land is cultivated with genetically modified plants. Therefore, as it is described by S. Marcinowski (2000), the plant biotechnology based in transgenic plants is the key solution in order to cover the demand for food of the expected growth of population by the FAO, taking into account that the agriculture area available will remain constant at 1.5 billion of hectares world-wide.

Genetic technology will also become an important tool for the production of health – promoting additives such as enzymes preparations, polyunsaturated fatty acids and vitamins. Nevertheless, the European citizens are the most sensitive group of people with great concern for the consumption of products made with food originated from

GMO. For instance, according to Bonny (2000), 32 % of France citizens consider GMO a food safety concern (see table Nº 2). In fact, the GMO concern at the European level takes second place after the mad cow concern in countries like UK, Germany and France. The GMO concern does not exist in countries such as USA, Japan, Canada and Argentina.

Table 2. Three food safety risks more considered by France citizens in three years ahead (April 2000).

% of people who mark	First	Second	Third	Total
BSE, mad cow diseases	27	16	10	52
GMO	14	10	9	**32**
Water pollution, nitrates	9	8	10	27
Listeria	9	11	7	26
Broken frost food chain	7	7	10	24
Hormones in meat	5	9	7	22
Dioxine	8	7	7	21
Antibiotic in animal production	4	6	6	17
Slurry distribution on the field	4	6	6	16
Chemical treatments of crops	3	5	7	14
Salmonella	2	5	6	13
Bad conservation conditions	2	4	4	10
Over time limit	2	2	4	9
Colorants and preservative	2	2	2	6

From Bonny, 2000.

Why today the European civilisation has a great concern on the use of this technology, when the majority of scientific work (Flachoswsky *et al.* 2000) is demonstrating that there is no potential risk for the consumers or the environment? At EU, several scientific committees have already expressed their opinions and the final conclusion was in favour, with only some recommendations which were given in order to reduce as much as possible the low potential risk. For instance SCAN adopted a positive opinion on the BT 176 corn for animal consumption and also recommended the future implantation of this technology without culture of cells resistant to a select antibiotic as marker (http://europa.eu.int/comm/food/fs/sc/oldcomm6/out01_en.html).

The possible answer is because at the European level that topic does not bring any substantial benefit on the economy of the majority of the population. Remember that the agriculture population in EU does not reach 4% of the active people. A second argument which in fact is not scientific, but could be considered, is that the new technology seems a fiction history when presented by the journalists to the readers and TV watchers. Finally the introduction of this products are supported by companies and not by funds from the official bodies as it used to be when the green revolution was implemented in the sixties and seventies. Frequently a new genetically modified crop is related with “big business and profits” which does not help to improve the image of these products in our European civilisation.

5.- Dioxin contamination (1997-2000).

More than 90 % of daily dioxin intake comes from food (Malish, 2000), and the animal origin is contributing more than 90 % of intake via food. The dioxin contamination of food of animal origin is basically the result of the contamination of feed ingredients. Therefore foodstuffs have a great role in the dioxin contamination of the food chain.

In this aspect, the recent cases of contamination (since 1997) of foodstuffs (citrus pulp pellets, oils, fats and kaolinitic clay) have shown the impact of these products as a source of contamination of animal origin with dioxin. WHO re-evaluated the recommendable daily intake in 1998 and stabilised a tolerable daily intake of 1-4 pg TEQ/kg bw/day. In addition, the committee has stressed that the goal is to reduce the intake below 1 pg TEQ/kg bw/day. In conclusion, the average contamination of food has to be reduced. A recent opinion of the SCAN has been published on this aspect (See http://europa.eu.int/comm/food/fs/sc/scan/outcome_en.html) and concluded that the contamination may occur at different levels and have different chemical and technological origins. The average contamination has divided the ingredients in four categories regarding the potential contamination levels (table 3). The higher contamination is in fish oil and fishmeal, which can contribute to the dioxin contamination of animal diets, even if their percentage of use is low. Furthermore it is also highlighted that fish oil and fishmeal from Europe (north) is much more contaminated than fish from the South pacific (Chile, Peru). However, the impact on the animal health indicates that no adverse effect would occur in animals, birds and fish if they were not challenged by severe accidental contamination. In general, in the SCAN opinion is also stated that, more basic data would be needed in order to assess the impact of diets when contaminated at the identified mean levels.

Table 3. Dioxin levels in feed materials (ng WHO-TEQ/kg D.M.)

Feed materials	Low	Mean	High	Category
Roughage	0.1	0.2	6.6	**
Cereals and seeds (legumes)	0.01	0.1	0.4	**
By-products from cereals and seeds	0.02	0.1	0.7	**
Vegetable oil	0.1	0.2	1.5	**
Fishmeal Pacific	0.004	0.04	0.08	**
Fishmeal Europe	0.04	1.2	5.6	****
Fish oil Pacific	0.03	0.2	0.5	**
Fish oil Europe	0.7	4.8	20	****
Mixed animal fat	0.5	1	3.3	***
Meat and bone meal	0.1	0.2	0.5	**
Milk by-products	0.06	0.12	0.48	**
Soil	0.5	5	87	n.b.
Binders, anticaking	0.1	0.2	0.5	**
Trace elements	0.1	0.2	0.5	**

****; *** > 0.2 ng WHO-TEQ/kg

** < 0.2 ng WHO-TEQ/kg

n.b.: dioxin not bioavailibility

From European commission, SCAN opinion.

Consequences of the crisis on food safety.

Having into account the crisis on food safety and especially the BSE scandal, the European Commission has taken some important decisions since 1996. The most important was to move the scientific safety risk assessment from legislative body to a new one, which must be more independent named Health and Consumer Protection. http://europa.eu.int/comm/dgs/health_consumer/index_en.htm. The SSC (Scientific Steering Committee) has produced a very important paper titled White Paper on Food Safety and the goal of this document is to assure the highest standards of food safety and it is also recommended to establish an independent European Food Authority. The White paper raised the standards of food safety, which introduce an integrated approach to the responsibility of feed manufacturers, farmers and food operators on the traceability of feed and food and their ingredients. In the same time, the developments of this approach need to be transparent making public scientific opinions and inspection reports.

This new agency would have to provide scientific advice on all aspects relating to food safety, operate rapid alert systems, and communicate and conduct dialogue with consumers on food safety and health issues as well as network with national agencies and scientific bodies. It is expected to be operative in 2002. The potential scope of the Authority will be mainly to carry on the risk analysis, which comprises risk assessment, risk management and risk communication. All of this action must be taken under independence, excellence and transparency.
http://europa.eu.int/comm/dgs/health_consumer/library/pub/index_en.html.

Is the European animal production less safe than others?

After the recent scandals it would appear that European animal production and especially animal nutrition is not safe. There is considerable criticism on this, however the EU has a vast range of legislation which affect and applies to feedstuffs, additives, vitamins, minerals and all substances which come into contact with food or feed during the manufacturing process. The EU decides which products are authorised in feed production and whether these substances pose a risk to human health if residues remain in the animal edible tissue or are affecting the environment. This that means the EU legislation is based on criteria of use of positive lists of products. Products are listed in the positive list after a scientific safety risk assessment. Independent scientific committees belonging to the Health Consumer Protection conducts the assessment (e.g. SCAN).
Once the scientific risk assessment is done then the risk management is conducted by the legislative and administration bodies of European Commission, which then go under the responsibility of the public authorities in each EU country. Actually, thanks to the new regulation and the reaction already taken it is thought that the health of the system is better than it used to be and will bring back the confidence on the food safety of the animal sector.

Comparing the animal production standards between several world regions, EU animal production is under fire due to food safety scandals. However, it is one of the global animal productions with higher standards in health and welfare of producing animals, which is essential for public health and consumer protection. Perhaps, one of the explanations why the perception of consumer is lower today is because most of action in the EU has been adopted in form of safeguard measures and the risk management and communication had some difficulties.

Why the safety legal regulation for animal nutrition is higher than for human?

In the European context, it is frequent to hear this question. This question is put forward because the risk assessment on feed additives and feed ingredients have been treated under a process quite more intensive than for products intended as food. Therefore, the idea of Safety of feed additives is not the same as that of food additives. Prof. G. Groop, member of SCAN (personal communication), justifies this inconsistency because nowadays the consumer has not the same opportunity to choose, when he is in front of a canned food versus a chop of meat, or other type of raw edible animal origin. In consequence, this is the basic element for a strong legal regulation on feed additive. For instance, today the already authorised new enzyme preparations and microorganism has been submitted to a safety assessment superior to what is requested for human food.

New model of European animal production, from quantity to quality.

The European animal production will be different in the future. There is no doubt about that. Farmers must look what the consumer demands and then he must be looking for a farming system, which recovers the public confidence on the food of animal origin as the first objective.

The new farming system will also be sustainable, according to Jörg Hartung (2000) this principle is understood to mean conserving the existence of something in the long term, or adopting it without any disadvantage for humankind and nature. In addition sustainability in livestock management must include not only environmental protection aspects, but also most particularly animal health and animal welfare. Safe animal food production will be another important criteria related to the sustainability concept. In conclusion, only high quality and safe food will be found in the market in the long term. In summary, the sustainability of animal production in the EU will be cover by three main points: **animal protection, consumer protection and environmental protection.**

Will the future European animal production remain intensive, specialised and regionally concentrated?

Trying to answer this question, it would interesting to look to the proposal of Jörg Hartung (2000), who considers that at present time there are three developments trends.

First. There is a trend towards a more simple and natural farming system which can be interpreted as ecological animal farming. It means lower number of animals per agricultural unit used area of the farm, and especial rules of implementation in order to use organic fertilisers. Use the outdoor farming management, that means an attractive summer picture, but all this requires more land, more soil erosion, and more intensive care of the health of animal because under this type of farming the animal could be more exposed to infections.

Second. There will be further technical developments in housing animal identification and automation. The future will be characterised by the use of microchips and intelligent machines. The advantages have been developed for the benefit of man until now. The real new development will be to create machines, which should be perceived by the animals as animal welfare enhancers. In conclusion, the use of new technology machines will give answers to the question of whether this technology is creating an animal-friendly farming environment.

Third. There is today a great focus on the potential use of new biotechnological processes. Field reproductive biology and molecular biology would be used in order to improve many important issues related to animal production such as: reproduction, improved diagnosis of hereditary defects, use recombinant substances (somatropin, phytase or any other glycosidase enzyme preparation), etc.

After these three trends of development, it cannot be forgotten that the future will be what the consumer's wish to have in our farm. Perhaps the European farming system will be far different from what it looks like today. However, sustainable animal production should be very related to biotechnology in order to increase the confidence of consumers and the behaviour of farmers and technical people will also be very important in order to look after the welfare of animals and the safety of the final products.

Having into account the potential developments in animal production, it could answer the question saying the future will be **intensive** due to the high requirements of biotechnological inputs and **specialised** due to also to the great requirements on human technology. The current **regionally concentrated** animal production might be modified substantially by environmental reasons and also due to animal health restrictions. Finally the goal of the European animal production will be to produce quality safety products acceptable for consumers and compatible with the environment and lucrative for farmers. After all, it will also have a compromise with the WTO in

order to transfer all the benefits of this European food concern (opportunity) in a new worldwide standard.

References.

Bonny, S. 2000. Les consommateurs, l'agriculture, la qualité et la sécurité des aliments: une analyse du questionement des consommateurs et des responses apportées. Productions Animals. Volume 13, Numero 5: 287-301

Brown, P.; Wiil, R.; Bradley, R.; Asher, D. M.; Detwiler, L. 2001. Bovine Spongiform Encephalopathy and Variant creutzeldt-Jakob Disease: Background, Evolution, qnd Current Concerns. Emerging Infectious Diseases, Vol. 7, No. 1,

Budka, H.M.D. 2000. The safety of ruminant blood with respect to TSE risks. Proceedings of the 6th Feed production conference. Facolta di Agraria U.C.S.C., Piacenza, November 27-28.

Flachoswky, G., Aulrich, K., Böhme, H., Daenicke, R. 2000. GMO in animal nutrition. Results of experiments at our Institute. Proceedings of the 6th Feed production conference. Facolta di Agraria U.C.S.C., Piacenza, November 27-28.

Hartung, J. 2000. Sustainable livestock, Production in the 21st century. Proceedings of the 7th Animal Nutrition Forum. Fine Chemicals of the BASF. Ludwigshafen, May 18-19.

Hedegaard, A. 2000. Danish approach on swine production with no antibiotics. In: III Conference on feed manufacturing in the Mediterranean region. March 22-24, Reus, Spain.

Jongbloed, A. 1998. Cited by the Committee on Antimicrobial Growth Promoters. Health Council of the Netherlands, Rijswijk Publication no. 1998/15E.

Kreysa, J. 2000. Geographical risk of bovine spongiform encephalopathy (GBR). Proceedings of the 6th Feed production conference. Facolta di Agraria U.C.S.C., Piacenza, November 27-28.

Lamming, G.E., 1986. Growth promotors. In: Future production and productivity in livestock farming. 2nd. Int. Conference of DSA. Brussels, April.

Malish, R. 2000. Dioxins in feedingstuffs and their consequences on food contents. Proceedings of the 6th Feed production conference. Facolta di Agraria U.C.S.C., Piacenza, November 27-28.

Marcinowski, S. 2000. The use of biotechnology and genetic engineering for agriculture and nutrition. Proceedings of the 7th Animal Nutrition Forum. Fine Chemicals of the BASF. Ludwigshafen, May 18-19.

Taylor, D.M. 2000. Inactivation of the BSE agent and the manufacture of MBM. Proceedings of the 6th Feed production conference. Facolta di Agraria U.C.S.C., Piacenza, November 27-28.