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Centre for Agricultural Strategy

Biotechnologies in agriculture and food- coming to the market

Edited by BJ Marshall & FA Miller

STP
S494.5
.B563
B535x
1996

CAS Paper 34

July 1996

3 Expectations for livestock production

Donald Curry

INTRODUCTION

In the meat and livestock sector we have some concern that if the launch of products using genetically-modified tomatoes was considered a brave step, then the ethical and emotional concerns of the consumer with regard to similar developments in our sector is indeed a delicate and sensitive area. I would like to begin by drawing a sharp distinction between the application of biotechnology to animals and the application of biotechnology to everything else that surrounds them in the production process - the feed supply, the veterinary armoury of aids against disease, the processing of their products (both edibles and non-edibles) and the processing of their wastes. While there will no doubt be consumer concerns about the second set of applications, these pale into insignificance compared to the concern about using biotechnology to alter animals themselves. But the non-animal applications will arrive first - indeed some have arrived already - and we shall see how the consumer reacts and how certain thorny problems like descriptors and labelling are resolved before we really have to address the same issues in the context of genetically-modified animals for meat or milk production.

CONSUMER REACTION

The livestock producer's primary concern is - how will the consumer react? Will this be yet another factor threatening to reduce the demand for his products or will the benefits from reduced costs and better quality that biotechnology clearly promises, enhance his market?

Furthermore, will this be another issue where the particular relationship of the British consumer with animals puts the livestock farmer at a competitive disadvantage internationally? Livestock producers expect that, in due course, plant breeders will exploit biotechnology to improve grass, clover and other forage crops (in terms of seasonality and drought resistance, for example) and the nutritional value of combinable crops as animal feeds, while new feed additives like enzymes will become available to improve nutrient availability or quality. Unfortunately, the biotech companies are likely to place higher priority on introducing resistance and achieving improvements in high-value crops for food processors than on improving the performance of animal feeds. The labelling of soyabeans, genetically modified to be resistant to glyphosate, has yet to be resolved. We are told it is impossible to differentiate modified bean products from unmodified in this essentially commodity market - so what does a farmer feeding pigs do if his ultimate multiple retailer customer will not accept the use of genetically-modified inputs? As other feed-supply sources are similarly modified, his room for manoeuvre will be further constrained as international trade in feeds is swept along on the tide of genetic modifications in distant supplier countries.

DISEASE PREVENTION, DIAGNOSIS AND TREATMENT

Biotechnology opens up immense new possibilities for prevention, diagnosis and treatment of animal diseases, and no doubt Professor Peters will bring us up-to-date on these developments, some of which are already in the market-place. Producers and those concerned about animal welfare can only welcome advances in these areas, provided they are protected by tight regulations and appropriate testing and licensing arrangements. This is definitely not an area where producers or consumers would accept deregulation!

PROCESSED PRODUCTS AND WASTE DISPOSAL

Similarly, I defer to a later speaker to set out the opportunities and problems of application of the biotechnology to the processing of the livestock producers' products - all the producer can say is 'take care - be sure you do not lose more in consumer confidence by using the technology than you gain in providing them with better products of greater variety'.

In the area of processing of waste both from farms and from meat plants, surely biotechnology has a great deal to offer in that environmental benefits must outweigh potential dangers, to the benefit of society *via* reduced ecological damage, odour and disposal

problems plus the extraction of new useful by-products. Obviously, close control is again necessary but this seems the least contentious area.

BIOTECHNOLOGY AND LIVESTOCK IMPROVEMENTS

I now come to the difficult bit - the use of biotechnology to improve the animals themselves. Since we have, through the process of domestication and selective breeding, already substantially modified our farm animals, perhaps I should say 'the use of biotechnology to *accelerate the rate of change* and the degree of adaptation of the farm animal population to the needs of consumers in an increasingly internationally competitive market-place'. I stress the international market place because we in the United Kingdom (UK) (and perhaps even the European Union (EU)) will find it increasingly difficult to 'go it alone'. If we constrain adoption of new technologies here, can we be sure that the products of those who do not will be barred from our market and, if not barred, will the British consumer conveniently forget their scruples when offered better and cheaper products from elsewhere exploiting these technologies? While accepting that there will be an important market in Britain and in the countries to which we export for products which can claim 'naturalness', and 'Britishness', and which are largely unprocessed, the growing market for processed foods will be increasingly satisfied by processed products in which the raw material, be it meat, milk or plant based, may be from unspecified sources where 'low cost' is the primary aim.

Setting aside these very real marketing concerns, we face new opportunities in the production of animals themselves in the four areas: gene markers, embryo transfer, gene transfer, and growth promoters.

Gene markers

From the growing knowledge of gene maps, genes that are markers for economically-important traits can be identified, which, by genotyping potential breeding animals, can speed up conventional selection processes. We see this as non-controversial and the Meat and Livestock Commission (MLC) is currently co-funding the Roslin Institute work to identify such markers in pigs and cattle.

Embryo transfer

This involves the implantation of designed embryos into recipient cows. At the laboratory level, embryos that are sexed and of desirable genetic make-up can be produced by *in vitro* fertilisation; this much we can do already. What is more, by transferring nuclei from cultured cells into eggs from which the nucleus has been removed, the

production of genetically-identical embryos will soon be possible. However, success at the laboratory level is a long way from commercial viability and we have some way to go before we can (with the help of the dairy farmer - not automatically available by any means) achieve a flow of uniform male top-quality beef calves from our dairy cows - the process my colleagues at MLC call 'deHolsteinisation' of our beef industry and regard as the Holy Grail! While this area is indeed controversial, our view, expressed to the Banner Committee and endorsed by our MLC Consumers' Committee, is that proper protection of the welfare of the donor, recipient and resulting animals is the prime need; given that, test tube manipulation will prove acceptable, as has artificial insemination (AI).

Gene transfer

The third area is the most controversial and the most subject to distortion - that is modification of animals by gene transfer, particularly if the transferred genes are copies of genes found in other species. The potential benefits are, in theory, dramatic, but we are some way from demonstrating that it is safe for the animal and the consumer - particularly, safe in the sense that the aimed-for benefit is achieved without unsuspected side effects. The early failures leading to arthritic pigs will take a long time to be outweighed by positive unharmed success stories. Consumer representatives are cautious, although modification to achieve greater disease resistance could be regarded as positive for animal welfare, while modifications to produce high-value pharmaceuticals and xenotransplants are high priority and will certainly focus the debate. We yet have time to engage in a constructive discussion with consumers and their representatives to prepare for adoption of these techniques - if not in Britain, then in countries that export products to us.

Growth promoters

The fourth area is topical - the use of genetic engineering to produce new growth promoters that have to be applied to or fed to individual animals. If welfare is protected, the primary concern of consumers is the danger of residues potentially damaging to human health. Our industry suffers from a growing scepticism among our customers about the reassurances on such issues provided by Government, its advisors and the scientists involved.

CONCLUSIONS

In summary, livestock producers are apprehensive of the effects of direct animal manipulation on consumer demand for their products and would prefer to see research first concentrated on feed, waste and disease control applications. We must debate this with consumers and

their representatives. We are asked 'why do this when I (the consumer) have not specifically asked for it?'. The answer is 'because we are almost certain that when our competitors do it, you will buy it - and we can't take that risk'.

Time will tell if consumer concerns here and in Europe can be overcome because the application of biotechnology globally is inevitable. Clearly, our oldest and largest industry and its customers have much to gain from the application of some of the newest and most exciting technologies.