

Opening Address by James Dargie

**Director, Joint FAO/IAEA Division of Nuclear Techniques in Food and
Agriculture, Vienna, Austria**

Ladies and Gentlemen,

Like the speakers before me, I'd like to welcome you all to this Symposium, and to say how pleased I am that we've been able to attract such a high quality field of livestock scientists and managers from all over the world. I believe we share a common vision- namely of ensuring that new scientific and technological developments are channelled in appropriate directions and with sufficient intensity to grasp the opportunities available through the livestock sector for eliminating the hunger and malnutrition which still afflict so many of our societies. I also wish to record my appreciation of the support given to this Symposium by the private sector which has enabled us to channel much more resources than would otherwise have been possible into ensuring that so many researchers and decision-makers from developing countries could be here this week.

The presence of Dr. Jutzi and others from FAO headquarters at this Symposium is not simply symbolic of the existence of a Division operated jointly between FAO and the IAEA that deals with many different aspects of food and agriculture. In fact, it's yet another example of two Divisions with staff that have a particularly close and effective track record of working together to help countries to analyse and solve the challenges they face in improving the performance of their livestock sectors. So, as we set about our work this week, bear in mind that although this meeting has been largely organised by the Joint Division and is taking place in Vienna, the lessons and recommendations from it will also be duly carried to FAO, and most importantly, I hope to your own countries and institutions.

Dr. Jutzi has given us an excellent entrée to the topic of this Symposium. He's painted the big picture in terms of global trends within the livestock sector, the opportunities it presents and the challenges it faces if it's going to play its full part in meeting people's expectations for diets that are not simply nutritionally better, but offer variety, quality and safety. These are expectations- indeed rights - common to essentially everyone whether they live in a modern city environment, or in a village in the Sahara or high Andes and no power in the world can change it.

The problem is that despite many positive trends, over a billion people are living on less than \$1 a day and around 850 million are malnourished, and that over the next 30 years there will be an additional 2 billion people to feed. Most of these people are and will be in South Asia and sub-Saharan Africa – the very parts of the world where the International Livestock Research Institute and FAO have recently shown from their poverty-livestock mapping studies that livestock intersect most forcefully with the poor. While this certainly helps to focus policy, institutional and research agendas, the questions it raises two questions: what tools do we have now, or will be needed in the future to intervene at the points of highest relevance to the people involved in the production and marketing systems existing in these regions; and how do they gain access to them?.

In attempting to answer these questions, we must bear in mind that not only do the majority of the poor engage in integrated crop – livestock or rangeland systems, but the reality that their assets are often not simply in cattle – the main focus of so much research in the past. They are also in crops, grasslands, sheep, goats, pigs and poultry, and in varieties, landraces, breeds or types that are indigenous to the regions, countries or localities concerned. We also cannot neglect the clear trend towards expansion of peri-urban and landless systems to cater for the demands of increasingly urbanized populations, and the opportunities and risks that these bring in terms of production, markets and people's health and livelihoods. And while the issues to be tackled, and the options for intervening to bring real and lasting benefits to people involved in these enterprises may differ, we must recognise the close inter-dependence of these systems, both nationally and internationally. Outbreaks of FMD, for instance in Europe and elsewhere and crop failures in Africa have surely taught us that by now.

Notwithstanding these and other considerations, the crux of the matter is that the parts of the world where poverty and livestock- keeping intersect most, are the very parts of the world where the productivity of livestock and the supply of products to consumers through formal and informal markets, are simply insufficient in quantity or quality to meet or create demand nationally, let alone compete in the international marketplace. In fact, a closer look at FAO's statistics on the livestock revolution referred to by Dr. Jutzi, reveals the stark reality that when countries like China, Brazil, Thailand and some others are removed from the equation, people in more than 40 developing countries do not have access to any more meat or milk than they had 10 years ago;

and very few countries are trading internationally in these and other livestock products.

So, in a nutshell, many- indeed most developing countries are simply not meeting or creating the demand for livestock or their products. There are of course very many reasons for this- internal and external, political and institutional, social and economic, environmental and technical; they vary widely between and within countries, and they are certainly both complex and evolving.

Dr. Jutzi has mentioned the great, possibly even the over-riding importance of sound livestock development policies within the framework of overall agricultural and national development plans. In effect the need for governments to take stock, consider long-term goals and options for achieving these; and then not only to formulate policies -but to devise ways of ensuring that the domestic and international institutional and other barriers to their adoption are progressively broken down. I couldn't agree more, and would only add that this process must start by encouraging policy and decision-makers to engage and stay engaged with the people for whom livestock matter – and increasingly that also means consumers –to understand their needs and concerns; and then in addressing these, to exploit the complementary roles of regulatory, economic and technical measures.

Putting all this into practice, and in particular ensuring poverty- focused development, is indeed the major challenge facing very many Member States of FAO and IAEA and which they, and the international community as a whole, are committed to achieving through the Millenium Development Goals. While many initiatives are taking place in this area, the contribution being made by Dr. Jutzi's Division in collaboration with ILRI and the UK in promoting a livelihoods orientation to policy development in the livestock sector is particularly noteworthy. In essence, it involves gathering, interpreting and communicating information from national case-studies about policies and strategies to all stakeholders with a view to improving transparency on policy between farmers, traders and governments; in effect, getting everyone to “buy in” to the processes of identifying their problems, assessing their options and making sensible selection and management decisions. There will clearly be a critical role for social scientists in the mix of expertise needed to do this effectively- something that for too long has been neglected in policy and technical decision-making.

Within that overarching framework, the policy objectives that governments set for their countries on science and technology, and the strategies they follow for achieving

these objectives will be critical for the future well-being of the livestock sector. Horizontal expansion is no longer a viable option for most countries if they are to respond to effective demand for livestock commodities. The goal must be intensification – higher output of meat, milk, eggs and other products per animal, coupled with less wastage and improved penetration into national and global markets. At the same time ensuring responsible stewardship of natural resources including animal genetic resources, and that the issue of animal welfare is not neglected will be essential.

Formidable as the challenges, and slow and variable between systems and countries as the evolution from extensive to more intensive yet sustainable production may be, access to new technologies and to the knowledge to use or adapt them locally, will be a vital; these have progressively transformed the way livestock products are produced and processed, and helped deliver both more and a wider variety of higher quality products to consumers. The fundamental policy challenge faced by governments then, is how to bring about the changes needed to empower communities to capture the economic and social benefits from the food and product chains derived from livestock that are available now or will come along in the future from both traditional and advanced science and technology, while managing the risks involved in doing so. If we take this line of argument further, and accept that the key factor enabling these changes was public, private and international investments in education, research and extension- appropriately channelled of course, and supported by the right local, national and international incentives and infrastructure, then we must accept also that the public sector, supported by the international development community, must continue to play a major role in the training of animal scientists, veterinarians and others. This can be fully justified by the public good component of knowledge, human capital development and information- the main products of research, and which collectively, by increasing the supply of technological opportunities and research resources, provide incentives to private investment and public-private sector partnerships for the benefit of local producers.

The problem here is that public sector livestock research and extension in most developing countries as well as international research are in trouble, with budgets stagnating or tightening, while private sector investments are growing in all too few of them. Since demand for technology is driven by consumer demand for the final products and market size, and because biological cycles are much longer than in

crops, R&D investments in livestock –related technology are seen as higher risk and attract substantially less investment to increase that demand. This catch 22 situation can only be resolved by a much greater commitment at national, regional and international levels to reshaping institutional structures and market signals. Within that, the commitment to capturing the increasing returns to scale on the supply side and creating critical masses of scientific creativity by establishing or strengthening R&D consortia and partnerships, including with private sector entities, would seem particularly important.

Dr. Jutzi has described some options for enhancing public-private sector partnerships in this era of privatisation and intellectual property rights. Certainly the public and international livestock research sectors will need to adjust to the realities of life, and carefully define and continuously refine their areas of comparative advantage, and we might debate what these should be, using examples that you yourselves may have or experiences from the crop sector.

Unquestionably, however, as a rule of thumb the largest social returns will come from focusing on research directed at carefully identified problem areas, and with clear public good components. This means putting much greater emphasis on people and systems than on livestock themselves. I believe also that society benefits when the public sector has freedom to operate, and when it maintains public access to genetic resources and research tools subject to IPR protection; but I accept that considerably more work needs to be done to improve our understanding of the influence of institutions such as the IPR regime, on both public and private sector investments in livestock research, and the public sector's freedom both to operate and collaborate with the private sector.

While many factors have combined to drive these changes over the last 20-30 years, foremost amongst them was the rapid strengthening of the impulse of biological science and the technology that developed with it, from a phenotypic to a genotypic orientation. Over this period, we have witnessed an increasingly rapid succession of advances leading to the development of recombinant DNA and molecular marker technology and of other techniques, allowing genome mapping and the function and regulation of genes and gene combinations to be studied. Words like proteomics, metabolomics, transcriptomics, microarrays and others, never before heard in the English language, are now common place in research circles – although still, I suspect, not part of the vocabulary of veterinarians treating calf scours on the farm!.

In any case, these techniques, which are now included under the heading of modern biotechnology, are currently being applied to unravel the structure and function of the bovine and other genomes of livestock; the plants that they eat and the micro-organisms that they use to digest their feed; as well as many of the pathogens and vectors of disease that affect them. A large part of what this represents today is new knowledge and better understanding of the mechanics of cell biology, hereditary and immune processes and the like- and I suspect, a mass of data in computers awaiting analysis using sophisticated software algorithms to handle gene prediction in different genomes.

There are, nevertheless, high expectations that out of all this will sooner or later come the knowledge and technologies to develop better livestock; better ways of feeding them- including reducing pollution from intensive systems; better ways of controlling pests and diseases through vaccines and therapeutic agents; better ways of characterising and preserving genetic resources etc. etc. etc.

Even allowing for the tendency of scientists and companies to over-emphasise the importance of their work, and the reality that advances in knowledge in gene structure and function will involve increasingly complex and expensive technology and data handling, and levels of multi-disciplinarity and interactions between academia and industry not hitherto seen, there has already been a steady stream of new information and technology resulting in farm-level application and more will surely come.

This is most obvious in the crop sector with the appearance over the last 10 years or so of genetically modified crops and of foods derived from these and in the shops and supermarkets of some countries, including all types of livestock products.

Recombinant DNA technology has also been successfully used to produce a number of livestock vaccines and some of these are commercially available and being used in both developed and developing countries; and although we have yet to see GM livestock and products from them on farms and in the market, the pace of progress in this field is rapid and expectations of commercial use in agriculture are increasing.

Yet, at the same time, we have seen the rather negative reactions of some societies in different parts of the world to this kind of science and the products it has produced; and we can only conclude in hindsight, that if we are to allow science to progress and society to benefit, we must do better in preparing our societies – not simply by proclaiming the benefits, but by fully addressing the potential risks and hazards to the safety of our food and the environment, and to the welfare of animals.

As Dr. Jutzi has pointed out, this Symposium is not about artificial insemination, embryo transfer, cloning, large scale culture of micro-organisms to produce vaccines and feed additives or any of the other techniques or products applied to living organisms. It's about reviewing and dissecting advances in genomics and molecular genetic approaches for improving livestock productivity and discussing future directions of R&D with a focus on developing countries.

After the two opening review papers, the Symposium will cover gene-based applications in the areas of livestock genetics and breeding; pathogens and host-pathogen interactions; plants, rumen microbes and systems biology; and food and environmental safety, ethics and intellectual property rights. So the programme is comprehensive, and because of the transcending nature of the approaches and techniques being used and the wider issues involved, it does I believe, provide an opportunity for you all to stay engaged throughout whatever your specific field of interest.

You will also see that a number of Panel Discussion Sessions have been arranged during the week. One is to consider which gene –based technologies are most relevant and likely to succeed in improving the sustainability of livestock production systems in developing countries. In doing this, I'd like you also to identify the constraints and to come up with recommendations on how these technologies can be used in a simple practical way and for what purpose- but always keeping in mind the need above all to secure and enhance the assets of poor livestock-keeping communities. And I'd like you to ask yourself two questions – difficult or uncomfortable as they may be to answer. The first is: given that AI has been around for 50 years, that a vaccine has been available for rinderpest for about the same time and that CBPP was eradicated from some African countries many years ago but is now back with a vengeance, what makes you think that these gene-based technologies will be any better or more widely used for societies' benefit than these and other existing technologies? Surely this shows that sound policies coupled with economics are often more important than technology. My second question is this- about 35 years ago, I worked at the Glasgow Veterinary School where we succeeded in developing and commercialising with the private sector a radiation attenuated vaccine against cattle lungworm and which is still widely used. Since then, tremendous efforts have gone into developing vaccines against other parasites, including through molecular approaches. But none has been

delivered. So the question is: what timescale are we really looking at before these and other products are available?

The second Panel Discussion is about the role of international organizations and funding agencies in furthering the use of gene –based technologies for livestock production in developing countries. Without pre-empting your deliberations on this, and before you set about it, I would invite you to have a look at the FAO web pages on biotechnology to see what’s been done so far. Certainly both FAO and IAEA believe that sharing knowledge and experiences between countries through meetings like this, and disseminating the information that comes from them through publishing the proceedings, are among their strongest comparative advantages. But there are other possibilities as well, such as our roles in promoting international coordination of effort and steering resources towards the problems of developing countries. In this regard I would particularly highlight the IAEA Research Contracts scheme which through support for Coordinated Research Projects, offers significant opportunities for developing and developed countries to work together in planning and carrying out activities involving nuclear techniques. Since isotopic markers are extensively used in molecular biology, and the IAEA will soon be planning its Programme and Budget for next biennium, it would be helpful if you could identify and prioritise potential areas for support through this mechanism. In short, I would like you to develop a plan for translating the recommendations from this Symposium into actions that can be considered by both IAEA and FAO.

Ladies and Gentlemen,

The social and economic disparities between the industrialized and developing countries are substantial, and in many cases growing even wider. Genomics research requires high capital investment and there are fears that the forces underpinning the livestock and genomics revolutions will combine to widen that gap further by diverting scarce funds and human resources in developing countries away from more traditional livestock systems and R&D activities, and through the much greater strength of scientific endeavour and appropriation of benefits from it by industrialized countries. These fears are well – founded, and while all countries will have to consider the opportunities and risks of these technologies in relation to the interest of their people, perhaps the greatest risk for the developing countries is to not get involved at all and to let the global markets for agricultural products and science and technology run their present course. This, I believe is not an option for anyone who

believes in social equity. The livestock sector, indeed the whole agricultural sector is so important to most developing countries for securing their social and economic progress that surely they must be given the chance to decide for themselves the paths they take in using science and technology for their future development; and surely in the spirit of solidarity – indeed self interest, the industrialized countries and international community must use all the means at their disposal to support these aspirations.

In concluding, I would like to think that during this week we have laid the grounds for contributing to that process.