

Latest international developments in genetics and  
Research & Development from the JSR technical team

## The 18th JSR Technical Conference 18th September 2007 "Putting Science into Practice"

This year's Technical Conference was attended by over 130 delegates from all sectors of the Pig Industry. This year's theme being 'Putting Science into Practice' certainly gave the audience food for thought!

The Chairman gave a cracking start to the 18th JSR conference pulling the strands of industry leadership, the increase in cereal prices, the slowness of retailers to respond to the agriculture need for higher prices and consumers' desires into a vision of the future by putting "science into practice". Bioscience is increasingly seen as an essential component to feeding the increasing number of people in the world, who as they become more affluent, also consume more. There is an urgent need to encourage young people into science to help practically create a better tomorrow, a better future.



### Professor Chris Pollock

– Delivering 21st Century agriculture in England's green and pleasant land

Professor Chris Pollock gave a tour de force overview of where UK agriculture has been, is and will be. In some senses he pre-empted Professor Wynn Jones in starting with the fact that agriculture needs leaders to be doing things differently or doing different things. Doing the same is not an option. Historically UK agricultural research has been very successful and has reduced the cost of food, ensured security of supply whilst maintaining viable farms. However, low commodity prices and loss of production subsidies means that farmers must adapt. Chris showed how agriculture's share of the UK food market had declined from 26% in 1994 to 15.5% in 2002. Although people promoted farmers markets and organic as a market solution these sectors were very small (joint total £0.86 billion) compared with the conventional grocery market of £104 billion. 85% of UK land use is in agriculture and the landscape is important recreationally and also as a source of water, renewable energy and protection from floods, etc. Europe has focussed only on land use for food without recognising other outputs. There are globalisation challenges, however Professor Pollock recognised that many "new" geographical areas of agricultural production exist by "mining" the environment and are unsustainable, whereas the UK has more favourable geography, rainfall and soil.

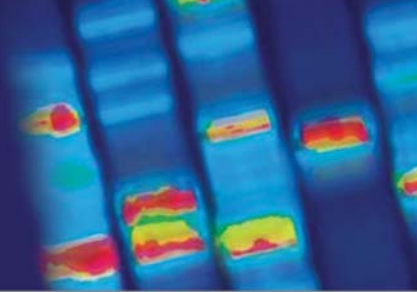


Chris challenged the industry to improve horizontal and vertical collaboration and chided the Government on the poor state of applied funding, the need for a land use strategy and land use R&D, and to reduce the number of funding providers. Importantly Chris noted the need to focus on a variety of costs and benefits and not solely on increased food production.

To ensure UK agriculture's long term viability there needs to be a proactive approach to secure food supply, safety and quality, which may not be at the lowest cost in the short term. Professor Pollock finished by saying that UK agriculture needs to increasingly add value but also to appropriate a greater share of that value, that we should view sustainable agricultural output not only as food and that the world was more unpredictable. Finally communication with politicians, retailers and consumers was vital.

...making pork more profitable...





## Dr Graham Plastow – Is science bringing home the bacon?

Dr Graham Plastow highlighted the huge benefits that quantitative genetics had delivered between 1962 and 2002: 50% more pigs, 33% less feed, 33% more lean and 50% less manure per kg lean. Some technologies such as AI, ET, ultrasonic backfat measures, FIRE and meat quality measurements had brought reductions in generation interval, improved accuracy or new traits. However, in pigs some technologies had not performed such as frozen semen, semen sexing, non-surgical embryo transfer. He expressed doubt about being able to sex semen in pigs at a commercially viable speed.

There are increasing societal demands on breeding companies to reduce the environmental footprint of our animals, improve welfare, quality and consistency. There are a few other ways to improve quantitative genetic selection, however there are potentially great gains from incorporating genetic marker information into our selection. The use of gene information is especially useful for traits such as animal health, reproduction and quality that are difficult to measure. However, the science has come full circle as there is now a clear need to get out into the field and “measure some of these difficult to measure traits” otherwise this technology will join others sitting on the shelf and unused.

There are other future technologies emerging such as DNA vaccination and RNA interference that potentially provide novel ways to improve animal and human health.



## Dr Grant Walling – Delivering results from JSR science

Dr Grant Walling highlighted a number of current obstacles to science: public perception, sensationalism, unbalanced reporting, lack of understanding and inadequate science education. Again in contrast to the general public perception of agriculture, JSR make extensive use of

- Statistical analysis in breeding evaluations, growth modelling, and carcass assessment;
- Reproductive technologies, and
- Image analysis: ultra-sound and CT scanning.

The global pig industry offers considerable opportunities for science and evidence based management. JSR illustrates an innovation production pipeline from initial discovery through to the marketing of breeding stock. JSR personnel and expertise are involved at all stages of discovery, proof of concept, development, trials, launch and marketing. At the early stages this involves close collaboration with partners such as the BBSRC, DEFRA, Genesis Faraday and DTI. Practical examples of each stage were given:

1. Discovery – Genomum, the genetics of maternal ability
2. Proof of concept – CT scanning
3. Development – JSR development of boar taint genetic markers
4. Trials – collaboration with Harper Adams University College in commercial trials
5. Launch – CT scanning in pigs
6. Marketing – VitaPork and Vitapork product trials with Geo Adams & sons

Grant finished by describing the good dialogue, dissemination and communication between JSR Genetics, producers and processors, and the need for better communication with retailers and consumers.

JSR recognise that success in today's rapidly changing marketplace depends on meeting the exacting demands of consumers



## Torben Kristensen – Genetics in the Antipodes

In some ways farming pigs in New Zealand is the same as Europe and others not. The shortage of skilled people and the use of workers from outside of the country is similar to Europe as is Government indifference to agriculture. The differences are interesting. The range of activities on Waratah farms is broad: pigs, dairy cows, bull beef and they grow and mill their own feed. They have a dairy, pig, sheep and goat AI operation. Torben showed some pictures of high litter size sows and excellent facilities with appropriate names such as the "Sheraton" - weaner, "Hilton" – grower finisher and "Backpacker" – gilt hardening off for sale!

Torben described how New Zealand agriculture and industry had changed from being subsidised to "free market". Waratah realised that it could not compete on price and needed to add value by producing a better product by becoming involved in breeding and by becoming involved with international partners such as JSR. Waratah also realised that activities on the farm had to complement each other going forward. For example they purchased more land to spread effluent on, to ensure that they could better guarantee a sustainable future. The slaughter weight at 65kg dead weight is a handicap for the industry, however Waratah farm differentiates its product as being corn fed, no growth hormones, Duroc, Halothane free and from paddock to plate.



## Professor Wynne Jones - Educating the industry leaders of tomorrow

Professor Wynne Jones addressed the crucial need for agricultural leaders and managers in the future. Wynne pointed out recent work on the importance of leadership "fit" to differing types of organisations such as Apple (design) and Wal-mart (low cost); the differences between leadership and managing, and the characteristics of good leaders.

The main thrust picked up themes from other speakers about the importance of UK agriculture adapting to globalisation and moving from subsidised EU intervention to a knowledge driven industry needing a full range of science, leadership and management skills. For this changing landscape, skills are needed in business and marketing, land and resource use, and people management issues. The education process has to address three areas of learning: enhancing a broad range of skills for individual development, meeting the subject aspiration of students and employers' demands for skills.

Harper Adams is collaborating with industry, for example with JSR on the new pig unit, but also with leadership and management work based learning schemes.

### Summary

The conference showed how, through leadership and management; science, genetics and genomics can be used practically through breeding companies in pig production and the food chain. Attracting young people into science, management and leadership was stressed by all speakers as UK agriculture responds to the challenges of climate change and globalisation.

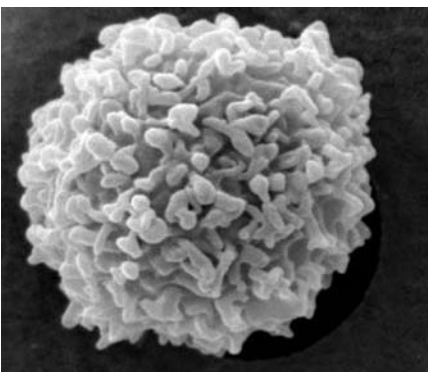
All the papers, past and present are available to download from the JSR website; [www.jsrgenetics.com](http://www.jsrgenetics.com)

## Genetics of Immunity

JSR is currently involved in research to study ways of improving the ability of pigs to resist disease.

Early research had shown that immune measures such as the number and proportions of certain types of white blood cells were predictive of the performance (as measured by daily gain) in a research population of pigs under commercial conditions. The research just completed, which took place over 3 years and was funded through LINK by JSR, Defra, MLC and 2 other breeding companies, and involved researchers from the Roslin Institute, investigated whether or not this was the case in breeding company herds.

Growth rate measurements and white blood cell counts were taken on animals reared on high health nucleus farms, and then on their progeny reared on farms of varying health conditions. The trial was designed deliberately to test animals' resistance to disease generally, rather than to test their resistance to a specific strain of one disease.



The results showed that animals with the highest growth rates had the lowest numbers and proportions of certain white blood cells, and that these traits were moderately heritable across farms. Total white blood cell count did not vary consistently with growth rate; it was only when the numbers and proportions of specific types of white blood cells were looked that a relationship was seen.

The results suggest that the growth rate of animals is linked to their ability to resist underlying disease and that this ability to resist underlying disease is inherited. Environmental differences did not greatly affect results. This means that animals that grow well and have low counts of specific white blood cells on high health farms, will have progeny that grow well and have low counts of specific white blood cells, even on low health farms. The results were presented at EAAP in 2006 and full details of the trial and results have been submitted for publication in the journal "Animal" later this year.

Due to the high correlation between the numbers of white blood cells and growth rate, and the high cost of measuring specific white blood cells, JSR are continuing to use growth rate on nucleus farms to select pigs that will perform better and resist disease better on commercial farms. However, we are now half way through a follow up project looking for genetic markers linked to the immune measures used in this trial. Testing for genetic markers would be cheaper than measuring immune traits directly and could be used with growth rate measurements to improve selection.

Annabelle Hoste  
JSR Genetics Ltd

