

Addressing Grand Challenges Through Science

***Roger Campbell
CEO Pork CRC***



The Challenges

They differ globally because of differences in:

- Legislation
- Consumer perceptions and culture
- Industry structure and infrastructure
- Market or profit drivers
- Input costs
- Disease status

Certainties

- We will continue to face change
- We will always compete with other meats
- Technical improvements are likely to lag changes in terms of trade (Opportunity for larger or system changing innovations)
- Continued difficulty obtaining good production staff

- Static or slowly increasing demand for pork
- Differences in the profit drivers across the supply chain (have different objectives and can be almost mutually exclusive)

- R&D funding likely to decline in real terms over time (5-10 years)
- Research capacity and capability declining in animal science and agriculture.

The business indicators for selected countries -2007

| KPI | Australia | Canada | USA | Holland | Brazil |
|-----------------------------|------------------|---------------|------------|----------------|---------------|
| Feed cost (\$ AUS/tonne) | 375 | 339 | 267 | 336 | 350 |
| HFC | 3.90 | 3.56 | 3.80 | 3.75 | 3.80 |
| HFC (Mcal ME/kg) | 12.3 | 10.0 | 12.8 | 11.4 | 11.5 |
| HFC (MJ DE/kg) | 53.5 | 43.8 | 55.1 | 49.3 | 52.1 |
| Pigs weaned | 21.2 | 22.3 | 22.9 | 26.4 | 20.0 |
| Pigs sold/sow/yr | 20.0 | 20.6 | 20.9 | 24.5 | 18.5 |
| Carcass weight (LB) | 158 | 207 | 205 | 180 | 174 |
| Carcass/sow/yr (LB) | 3142 | 4257 | 4279 | 4407 | 3093 |



Australia's challenges

| Constraint | Current | Need | Specification | Challenge |
|----------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|
| Grains Feed Costs | Food grains and real value unknown | Feed grains specific for pigs Rapid nutrient assessment Better Grains | High DE yield/hectare Lower cost per unit DE | Culture change required. Never done Grand challenge? |
| HFC | Too damned high | Pigs that don't need feed? More pigs/sow (Volume) Lower mortality Better pigs? | 6.7 Mcal DE - 20 to 105 kg 24+ pigs sold | Grand challenge? We know this can be done. |
| Price | Too damned low | Better pork | More healthy More desirable | Something that excites consumers |



Other challenges

- ▶ Declining State Government support of pig R&D
- ▶ Declining research infrastructure
- ▶ Declining or gap in research base (scientists)
- ▶ Lack of interest and encouragement by/of undergraduate and postgraduate students in the pork industry



Some Common factors

- **The biology is identical**
- **Research base is strong globally**
- **Some business indicators apply globally (Feed efficiency ,reproductive efficiency, better and more rapid knowledge of raw materials (more cost effective diet formulation , labour constraints)**
- **Increasing the nutrient availability from feed materials**
- **Need to compete against and beat broilers and beef.**

Efficient use of research funds

- **I would suggest that research funds should only be invested in major projects where the problem or expertise is unique to the country or region.**

- **If the solution and or expertise exists elsewhere collaboration is a more efficient strategy.**

The Grand Challenges

- ▶ Grains and other ingredients that are 100% digestible and lower cost per unit of nutrient (energy).
- ▶ Pigs and systems that don't need feed – reduce energy use per kg of pork produced by 30%.
- ▶ Increase the desirability and demand for pork- increase real demand by 3% annually.
- ▶ Reduce labour input into pork production – technologies that effectively replace people.
- ▶ Increase undergraduate interest in the pork industry and the number postgraduates trained in the areas where expertise is most lacking (targeted training).
- ▶ Better integrate research and postgraduate training with the commercial sector.
- ▶ Provide a more consistent and profitable business environment for pork producers.



So find or create us a pig that doesn't need feed

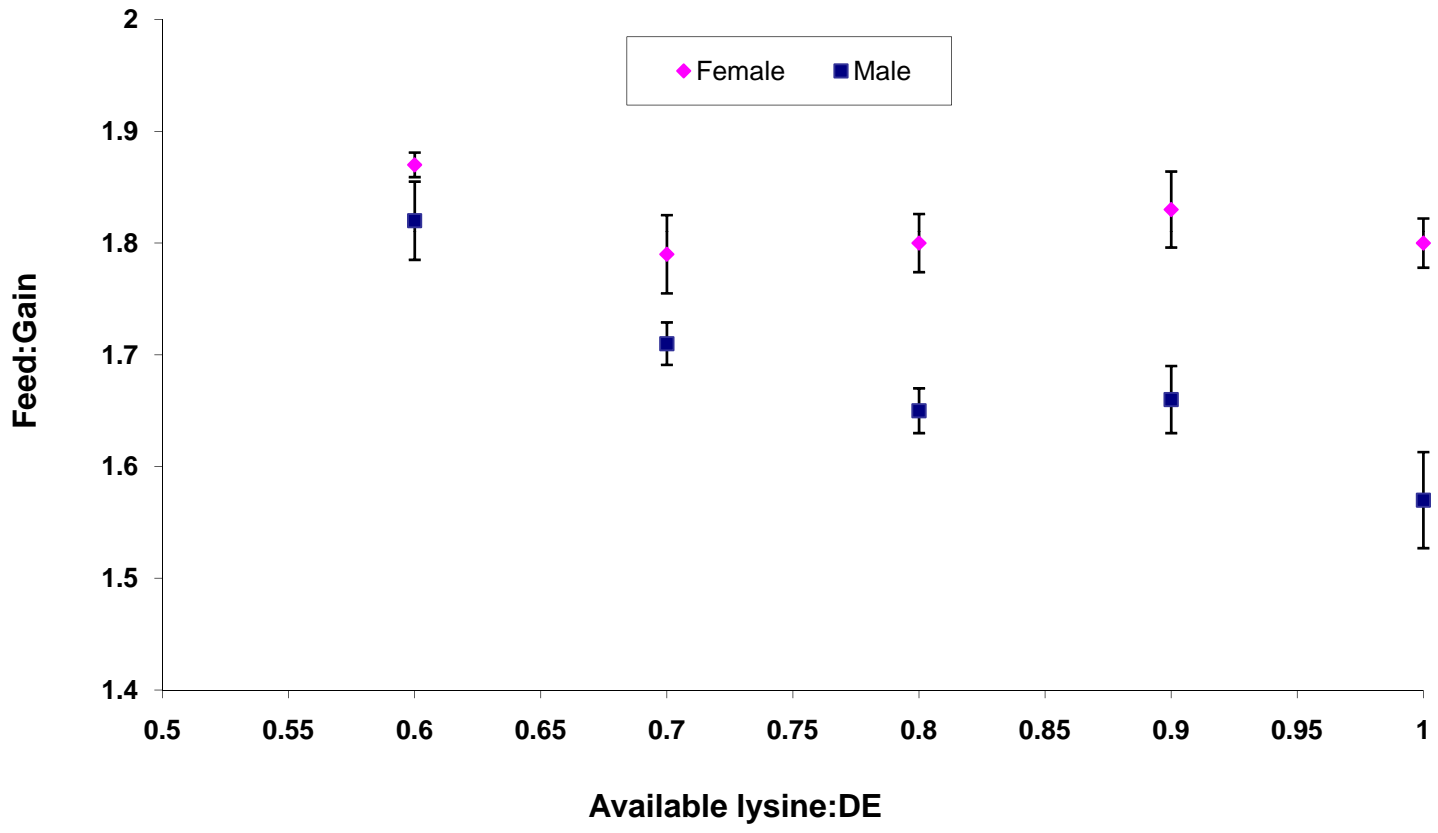
- Does the USA have them?
- May exist in Europe?
- Technologies available to get them into Australia?
- Better define what is available here?
- If they exist – how do we make them more rapidly available to all producers?
- What's next – more rapid further improvement?
- We have the cash to support new science that addresses the challenge.

Well they found one

- ▶ Introduced a different genotype into one of our research facilities fitted with Feedlogics system.
- ▶ Looking at lysine responses in male and female pigs between 22 and 53 kg.
- ▶ Also effects of using a single diet or weekly changes in the diets from 20 to 105 kg in females.
- ▶ Effects of timing of second Immunocastration “vaccination” on performance changes over six weeks.



Feed: gain responses of male and female pigs to available lysine (%) between 22 and 53 kg



Feed and energy efficiencies 22 to 105 kg

| <i>Gender</i> | <i>Male</i> | <i>Female</i> |
|--------------------------|-------------|---------------|
| Feed: gain | 1.96 | 2.20 |
| DE/kg gain (MJ) | 26.3 | 30.0 |
| ME/kg gain (Mcal) | 6.03 | 6.88 |



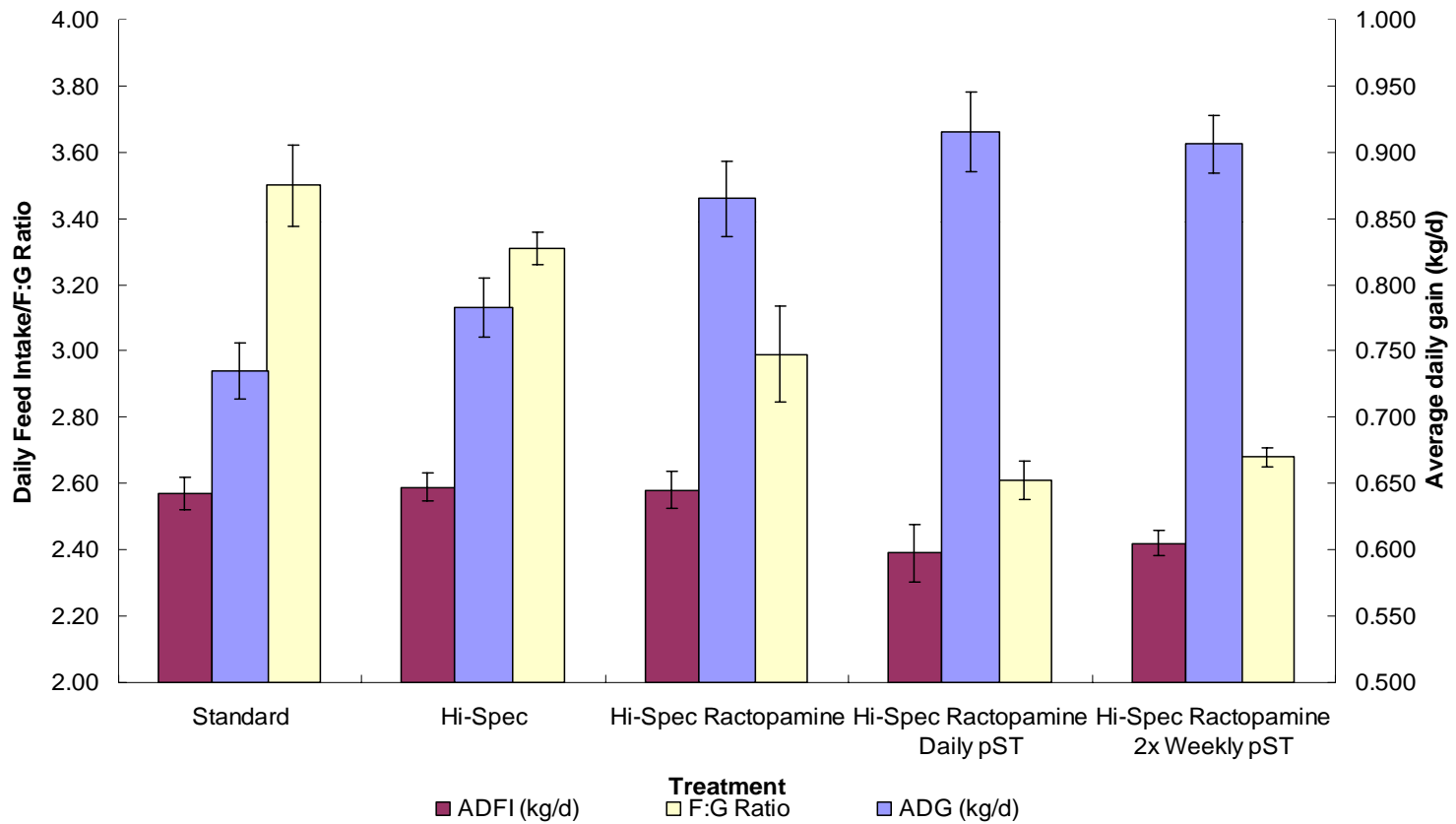
***Impact on HFC selling 21 pigs/sow/year
(carcass weight = 72 kg)***

HFC would decline from 3.9 to 3.15

Increasing protein deposition in late finishing

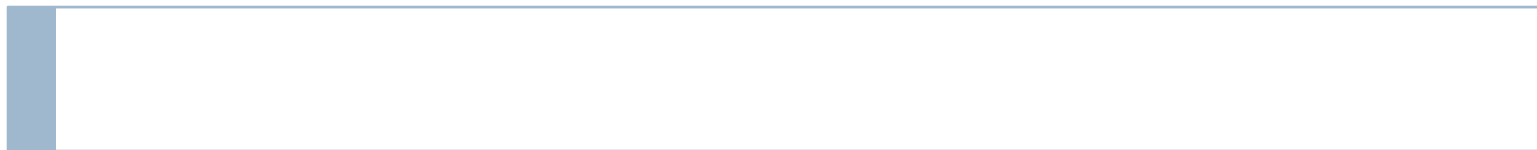
- **Installed Feedlogics system in 1200 head finishing barn in commercial business**
- **Measured performance over last 4 weeks of production.**
- **Female pigs**
- **Tested higher specification diet, Ractopamine (5 ppm 28 d)and Ractopamine (28 d) plus daily or thrice weekly PST in last 14 days.**

Increasing protein deposition in last 4 weeks in commercial situations



Implications

- **Output increased by 4596 kg carcass weight.**
- **Feed used reduced by 16,800 kg**
- **Profit improved by at least \$7.70/pig**



The Challenge

- Develop or modify a technology and or pig that can achieve the same outcome without having to administer PST – or not by injection.**

Grand Challenges –exist throughout the supply chain

- **Feed –nobody dictated that pigs have to be fed grain?**

- **More rapid genetic gain at commercial level – AI,IVF cloning, semen sexing and other?**
- **Reducing energy use and carbon foot print**
- **Animal health**

- **Synchronization of ovulation and set time mating**

All have scientific solutions

- **Need to identify and focus on greatest challenges and opportunities –time for change?**
- **USA (and others) has the technological (basic science) expertise and infrastructure – but of limited value if allowed to work independently of each other and industry**
- **Need to coordinate with those with technical and commercial expertise – how to interpret and extract the dollar or bottom line value**
- **A collaborative but coordinated approach required involving Government(s), commercial players Universities , suppliers and private research/technical organizations.**
- **Collaboration should be global – how to most effectively use funds available to achieve goals. It is ideas and expertise that are needed and some bright people and appropriate facilities exist outside the USA.**

Need a model?



- **Pork CRC – funded for 7 years by Federal Government and participants**
 - **Participants include all producers in part through APL (check off) , private pork businesses Universities ,Suppliers , State Government organizations and international groups.**
 - **Approximately 50% of cash from Federal government**
 - **Remainder from participants and other sources of income**
 - **Participants contribute in kind in the form of staff and facilities for R&D.**
- **Has focused R&D on enhancing supply chain efficiency from grains through to processing.**
 - **Created tremendous research activity and collaboration across industry and participants.**
 - **Have some of brightest scientists working closely with industry to solve problems and develop new systems. Scientists have been attracted from outside the pork arena**
- **Rapid solutions to commercial participants problems.**
 - **Attracted excellent undergraduate and postgraduate students doing research in commercial facilities.**
- **Need cash ,excitement and challenges.**