

# **Technologies for Sustainable Animal Husbandry (swine production) in China**

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- **Status of China Animal Husbandry (swine production)**
- **Common Problems EU and China Facing**
- **Suggestions for Cooperation Technologies between EU and China**

# Status of China Animal Husbandry (swine production)



## □ Market Size

- The size of the breakdown of the inventory for August 2013, breeding stock was around 50.73 million sows and total on farm inventory was around 451.94 million . (as compared to July 2013-breeding stock was around 50.58 million and total on farm inventory was around 447.91 million ), August is up 0.9 per cent from July.
- Estimated annual market pig slaughter for 2012 is at 714.27 million head divided by about 50 million sows and we get about 14.29 pigs marketed/sow/year.

# Status of China Animal Husbandry (swine production)



Price	September 30 <sup>th</sup> , 2013	September 30 <sup>th</sup> , 2012	% increase/decrease year-on-year
<b>Pig price</b>	15.6 RMB/kg ( \$2.55 US/kg or \$1.16 US/lb	14.49 RMB/kg ( \$2.37 US/kg or \$1.07 US/lb	+ 7.66%
<b>Pork price</b>	24.26 RMB/kg ( \$ 3.96 US/kg or \$ 1.80 US/lb	23.34 RMB/kg ( \$3.81 US/kg or \$1.73 US/lb	+ 3.94%
<b>Piglet price</b>	28.74 RMB/kg ( \$ 4.70 US/kg or \$ 2.13US/lb	27.23 RMB/kg ( \$4.45 US/kg or \$ 2.02 US/lb	+ 5.24%
<b>Sow price</b>	1,751 RMB/head ( \$ 286.17 US/head	1,715 RMB/head ( \$ 280.29 US/head	+ 2.08%

# Status of China Animal Husbandry (swine production)



## □ Problems

- Environment Pollution
- Diseases
- Genetic Resources
- Feedstuff
- Food Safety and Security
- Profit Margins and Less labor

# Status of China Animal Husbandry (swine production)



# Status of China Animal Husbandry (swine production)



- FMD
- PRRS
- PED
- PCV2
- Animal Influenza
- E. Coli.

# Status of China Animal Husbandry (swine production)



- **Study Shows Chinese PED Virus is New Variant**

A recent study suggests that current isolates of the Porcine Epidemic Diarrhoea virus (PEDV) underwent genetic variation in 2010 from their South Korean and/or Chinese origins, thus forming the current new PEDV genotype in China.

- **OIE: Tibetan Outbreak of Foot and Mouth Disease**

24 April 2013: Over 150 animals have been destroyed following a foot and mouth disease (FMD) outbreak in the Rikaze region of Tibet. A total of 32 cases on one holding in Kare Village left 156 cattle, sheep and goats susceptible all of which have been destroyed.

- **Pigs Found Infected with Avian Flu in Southern China**, 24 December 2012  
Researchers report for the first time the seroprevalence of three strains of avian influenza viruses in pigs in southern China, but not the H5N1 avian influenza virus



# Status of China Animal Husbandry (swine production)



- **Local Pig Breeds in Decline in China:**

Research shows that 85 per cent of domestic pig breeds are facing a decline in numbers and 31 breeds are endangered







# Status of China Animal Husbandry (swine production)



- **Food Safety System**

## □ Topics on swine production, including:

- The latest developments in swine genetics and their applications for the Chinese market, as well as how to optimize management for large-scale farms.
- Research on senior piglet nutrition and its applications.
- Research and applications of new raw materials and additives in swine nutrition.
- Research on the relationship between seasonal periods and swine productivity.
- Cause and treatment of diarrhea in piglets.
- Effective management of mycotoxin risks in swine production.

## □ Topics on Animal Husbandry, including:

- Controlling in safety of feed and food
- Preventing and elimination of diseases systematically
- Improving the ability in prevention and diagnosis of diseases
- Reducing the labor cost by lean manufacturing
- Manure treatment and protection of environment
- Specific research in plans of large-scale and professional pig farms including animal nutrition, feeding management, biosecurity and health management, cost accounting and management, training and management of talents, industrial operation and management
- Increasing farms' profit by improving the production and reproduction
- Risk management and control in brain drain, market and investment
- Modernized system of data recording and management of information
- Use of efficient and high price performance ratio biological products including vaccine, healthcare products, micro-ecology and disinfectant products

# Suggestions for Cooperation Technologies between EU and China



## Swine Breeding and Genetics

### I. Modern Development of Genetic and Breeding System and Genetic Resource Sharing

#### □ Status

##### ● Superiority

1. Rich in pig breeds resources
2. The changing of pigs production makes the need for the improved breeds increasing
3. Country constants promote the development of the pig breeding system

##### ● Challenge

1. The breeding conception was out-of-date
2. Short of strategy, long-lasting and systematization
3. The standardization and normalization of breeding process was low
4. The nuclear breeding herds was dispersed, small-scale , and low selection intensity
5. The performance test was not long-term, standard and reliable
6. The breeding plan cannot be implement reliably
7. The information for breeding was not complete and was lowly utilized
8. The excellent breeding pigs was lacked and was not fully utilized or sharing
9. The method and technology was backward. Also we were not make use of the world advanced technology



# Suggestions for Cooperation Technologies between EU and China



## Swine Breeding and Genetics

### Modern Development of Genetic and Breeding System and Genetic Resource Sharing

#### □ Cooperation Opportunities

China produces 600 million pigs and 50 million livestock on hand annually. But the Breeding Pigs are dependent on America and Europe. The keys words of the golden industry chain of live pig industry will be intensification, large-scale, industrialization, informationization, high effectiveness, ecology, intelligent, technology and capitalizing

European is efficient in pig production. Furthermore, the breeding idea, technology and methods are well-developed. It possesses a lot of international breeding corporations, such as DanBred, Topigs, Hypor and so on. Therefore, it is important to Sino-European pig breeding Cooperation. It has played an important role in the development of Chinese pig breeding, sharing of the excellent breeding pig and database, increasing the modern technology application, training of senior scientists in pig breeding, increasing the breeding pig commercialized, improving the efficiency of Chinese sows production and reproduction, enhancement disease-resistant ability, reducing the number of sows livestock, and protection of ecology environment.

## Animal Nutrition and Feed

### Organization of traceable feed QMS together with Safe, low carbon and high production systems

#### □ Status

There are over 10,000 feed companies in China producing over 200,000,000 tons of modern commercial feed per year. Because of development of industrialization both in pig production and financing, there are drastic changes in development pattern and competition of feed industry as shown in following 7 aspects, *Material, Machinery, Money, Manpower, Market, Mechanism* and *Morale*. But the support and service ability to the customers is fundamental in competition within commercial feed industry, and the key points are measurements to improve performance, productivity and profitability in pig production. The final goals that we shared are providing consumers with palatable, safe and healthy pork products by improving production of reproductive performance and profits through indepth participating in advanced pig production.

# Suggestions for Cooperation Technologies between EU and China



## Animal Nutrition and Feed

### Organization of traceable feed QMS together with Safe, low carbon and high production systems

#### □ Cooperation Opportunities

- There is a great significance in Sino-European cooperation in feed industry especially in the aspect of organization of traceable feed QMS as well as safe, low carbon and high production systems. There are a series of challenges in development of large-scale pig industry and feed industrialization in China, including traceable QMS of feed production, safe, low carbon and high production systems, application of lean production and zero inventory, accurately evaluation and use of feed ingredients, application of digestive amino acids and net energy system, feed formulation in post-antibiotic era, feeding management under pressure of high cost, application of expanding technique and hot grinding technique, alternatives of animal protein feedstuffs eg. fish meal, efficient sow production method in modern welfare barn, liquid feeding system, and adjustment in feed usage scenarios in intelligentized system.
- The systematic solutions for limiting the use of antibiotics and the derived techniques such as probiotics and their application ; the systematic solutions for establishing the environmental friendly animal husbandry practices

## Animal Nutrition and Feed

- Gastrointestinal Microbiology in Pig
- Direct Fed Microorganism

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## I. A cell platform technology for pig vaccine production

### □ Objective

- Adaptation of adherent commercial cell lines to high density suspension cultures
- Generation of monocytic cells tailored for PRRS, PCV2 and CSF virus cultures

### □ Contents

- Transformation of commercial cell lines with genes that interfere with cell adhesion has been used to convert adherent cells into cell suspensions
- Explore the use of gelatine microcarriers for expanding currently used cell lines (Vero, MDCK and PK-15)
- Exploit the multi-differentiation potential of pig ES cells (pES)
- Consist in the modulation of gene expression of specific transcription factors in pulmonary macrophages and peripheral blood lymphocytes

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## II. Development of a nanoparticle vectored subunit swine influenza vaccine formulation

### □Objective

- Address the hypothesis that the T cell mediated immune response to SIV can be induced by presentation of specific viral polypeptide sequences presented via a novel nanoparticulate formulation

### □Contents

- Identification of viral proteins involved in T-cell immunity.
- Cloning, expression and purification of SIV proteins using insect cell and bacterial expression systems, respectively
- Optimisation of the loading and coating of PLGA nanoparticles with recombinant SIV proteins.
- Assessment of the effects of loading different TLR agonists on stimulating porcine DC maturation in vitro, including a comparison of the effects of encapsulation versus coating
- Evaluation in vivo of the immunogenicity and efficacy of an optimally loaded nanoparticulate formulation of SIV proteins

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## III. Bacterial and viral platforms for the delivery of polyvalent vaccines for pig respiratory diseases

### ▣ Objective

- Develop platforms for the simultaneous delivery of multiple pathogen epitopes with initial delivery of bivalent vaccines for bacterial and viral respiratory diseases of swine.

### ▣ Contents

- Use *Pasteurella multocida* and deletion mutant of SuHV-1 as the basis for vaccine strains against bacterial and viral pathogens respectively. Theoretically, a bacterial vector could be used as the basis for a polyvalent vaccine for both bacterial and viral pathogens.

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## IV. Technology in prevention of Classical Swine Fever (CSF) and Foot-Mouth Disease (FMD)

### ▣ Status

We have made great progress in preventing CSF and FMD, majority of our vaccines could not tell the difference between nature infections from vaccination. However, the marked, recombinant and DNA vaccines could do so.

### ▣ Cooperation Opportunities

Europe countries have relatively advanced technology in prevention of Classical Swine Fever (CSF) and Foot-Mouth Disease (FMD). Collaboration with Europe countries to develop marked or recombinant even DNA vaccines for CSF and FMD vaccines will be helpful to eliminate these diseases in China. These vaccines will be essential for our country to eliminate those diseases in the future.



# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## V. Single dose combination vaccines for CSF and FMD

During marked vaccine and recombinant vaccine development, we need to further collaborate to develop single dose combination vaccines for CSF and FMD. The single dose combo vaccines could not only reduce the vaccination time, but also reduce the pig stress as well as lower the cost significantly. This approach will significantly promote large scale and mechanical raising pigs in China.

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## VI. Mass Application of swine vaccines

Another collaboration project should be Mass Application of swine vaccines, such as through drinking water or aerosol. Development of mass application swine vaccines will be a “revolutionary” innovation”. Mass application of swine vaccines can not only reduce pig stress, but also vaccinate ten--thousand pigs easily, greatly lower the cost of raising pigs. Mass application will be the direction of global swine vaccine research and development in the future.

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## VII. FMD and Bluetongue control and related vaccines for cattle and sheep

Europe countries have made good progress in FMD and Bluetongue control and related vaccines for cattle and sheep. China is a huge market of cattle and sheep raising. China-Europe collaboration in the field of FMD and Bluetongue recombinant vaccines will be mutual benefit with win-win situation.

# Suggestions for Cooperation Technologies between EU and China-- Animal Health



## VIII. New Type Adjuvant System

Adjuvant is a key component and plays an essential role in vaccine. Collaboration between China and Europe on new adjuvant will be a “win-win” situation. We could make best use of Europe’s advanced laboratory technique and China’s potential advantages of animal trials to develop new adjuvant system and make breakthrough on animal vaccines.

**THANKS FOR YOUR  
ATTENTIONS!**