

Modern pig farming in the People's Republic of China: growth and veterinary challenges

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Submitted for publication: 4 January 2010

Accepted for publication: 24 June 2011

Summary

Cyclical oversupply and non-profitability situations have led to pig industry consolidations in the People's Republic of China, with many smaller farmers leaving the industry. In 2007, pork supply worsened due to outbreaks of 'high fever blue-ear disease', a complex disease issue that includes highly virulent porcine reproductive and respiratory syndrome, porcine circovirus and classical swine fever. Best estimates suggest that 50 million pigs were affected. More recent natural disasters (earthquakes/freezing winters) have also limited pig production in some areas. Overall expansion of the Chinese breeding herd is now continuing at a good pace and is likely to be sufficient to supply the predicted 7% annual increase in demand for pork. High prices of feed ingredients (cereals and soybean) continue to create cost-of-production issues. Authorities have instigated many helpful measures over the past decade, including insurance for farm breeder stock, direct subsidies for farm expansions and breeding programmes, free supplies of some vaccines, and taxation exemptions. Specific challenges remaining include: the high levels of spread, persistence and on-farm impact of key virus infections on single-site farm systems; the variable titre and potency of some local vaccines; the low level of technical capacity in laboratories and the lack of training and expertise among farm staff; and the lack of a distinctive representative voice for pig farmers.

Keywords

Backyard farm – Commercial farm – Classical swine fever – Farm system – Farrow-to-finish – People's Republic of China – Pig farming – Porcine reproductive and respiratory syndrome.

Background and objectives

Pork is the meat of cultural choice for Han Chinese, regularly accounting for 70% or more of meat products eaten by consumers, with an annual pork consumption per person of 38 kg. The great majority of pig production (approximately 85%) is eaten as freshly slaughtered and butchered cuts, which are used in a wide range of pig meat

and offal recipes. Many of these chosen cuts and dishes are eaten for specific purposes or on particular occasions, for example, pig trotters are eaten prior to a journey and pig lung soup is eaten to help cure breathing problems. The 45 or so extant native Chinese pig breeds were bred over time for important and desirable traits such as fatty carcasses with lard deposition, a good foraging appetite and hardiness outdoors. The main breed groups are the TaiHu valley breeds (such as the Meishan), the central

China two-end black pig breeds (such as the Jinhua), the leaner meat breeds (such as the SuTai), the various local fatty pork breeds (such as the Min), and the smaller hill pig breeds (such as the Xiang roaster pigs) (3, 6). Around 1900, there were extensive introductions into the People's Republic of China (hereafter referred to as China) of leaner European breeds, via the Russian, British and German colonies, with improvement and breeding programmes continuing through the 20th Century (3, 8). TaiHu valley pigs continue to hold a fascination for western pig breeders because of their high fertility, excellent mothering ability, placid nature and extra teats.

Demand in China for pork products derived from lean western breeds has been growing steadily in this century and is predicted to continue to grow at a rate of between 4% and 7% per year. This is due to the steady rise in China's population and the urbanisation of much of this population; urban residents regularly eat more meat products, including frozen or processed pork (10). However, the true extent of any 'westernisation' away from the traditional preference for fresh cuts of lean or fatty pork will probably remain limited for the foreseeable 10 years at least. The demands for native fatty pork products are hard to predict, but will probably continue to be strong.

This paper explores the trends in pig farming in China, particularly those related to pig health issues.

Trends in pig farming in China

Pig farming in China is carried out in backyard, small, and large commercial farms. The actual numbers of pigs raised in China is not known exactly – local estimates and estimates reported by the Food and Agriculture Organization of the United Nations (FAO) for 2009–2010 vary between 490 million and 618 million pigs. In contrast, other Asian countries, such as Vietnam, the Philippines and Thailand, which have similar overall pig production characteristics, only produce 33 million, 13 million and 8 million pigs respectively. However, the percentage of pigs that are raised in intensive pig systems in China is rising quickly. Farms with more than 30 sows now constitute 60% of the pig population in China. Major production centres and larger farms are found around Beijing, Shanghai and Guangzhou, but numerous smaller farms contribute a considerable amount to total farm output in most central provinces. Rural backyard farmers typically sell only 5 to 10 pigs per year to local markets, usually earning between 80 and 100 renminbi (RMB = yuan) per pig (6.6 RMB = US\$1). These comparatively low farm-gate prices are offset for the farmer and his family by the negligible input costs (these pigs are usually fed waste products) and the strong asset protection provided by these livestock. This backyard pig production sector (30% to 40% of China's pigs) is therefore relatively stable.

Figure 1 outlines the growth in total pork output in China over the past few decades. Some further indications on overall Chinese pig numbers and pork output/consumption data have been provided by the FAO (faostat.fao.org). The private sale of pigs was first permitted in 1975, and private control over pig and pork prices and pig purchases was first introduced in 1985. This led to a rapid rise in pig ownership and farming. This increase continued through the early 1990s and by the mid-1990s a major oversupply led pig farming to become unprofitable. This, in turn, led to industry consolidation, with many small farmers leaving the industry. This situation was repeated in 2005 and 2006, when low pig farm profitability resulted in farm closures and many rural farmers had to move to work on urban construction projects. In the later part of 2006 and throughout 2007, the supply shortage worsened further due to high levels of diseases, particularly outbreaks of 'high fever blue-ear disease', which was in fact a complex set of problems that included highly virulent porcine reproductive and respiratory syndrome (PRRS), classical swine fever (CSF) and porcine circovirus-associated diseases caused by porcine circovirus 2 (PCV2), often occurring together on many farms (7, 12). Best estimates of the effect of this health issue suggest that around 9% of the pig population (50 million pigs) were taken out of the supply chain in 2007. This led to rapid rises in pork prices and restricted access to pork for many people (17). These issues also led to re-direction of the moderate export trade in frozen Chinese pork (such as to Ukraine) over to local consumption. The Chinese government has made several specific and valuable responses to these issues of farm profitability and disease control (see below).

Unfortunately, in 2007/2008, the very long and cold winter in the hilly south-east provinces of Guangxi, Hunan and Jiangxi, affected the many local key breeder farms, killing approximately one million pigs. Affected breeder farms could not fully supply young growing pigs to the adjacent Guangdong farms and markets. Then in May 2008, the Sichuan earthquake led to the loss of an estimated four million growing pigs, which, however, was only suggested to lower Sichuan Province pork production by between 2% and 4% in 2008.

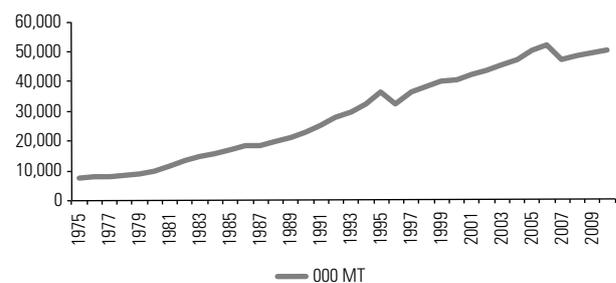


Fig. 1
Pork production in China from 1975 to 2010
Output shown per 1,000 metric tonnes

More recently, in 2009 the overall reduction in urban construction programmes led to a rise in mobile returned workers re-activating rural pig farming operations. The estimated 140 million migrants moving from urban centres to rural areas in China were highly mobile and largely young and male (5). Since 2010, all the above factors have led to larger pig farms being developed in more central and rural provinces (see Table I).

Figure 2 charts the fluctuations of the commercial farm-gate prices and retail prices for the past ten years. The farm-gate prices vary between 7 RMB and 20 RMB and the retail prices vary between 10 RMB and 28 RMB, and they appear to show cycles of 2 to 5 years, with the steepest drop in prices occurring in May 2006 and May 2009 and the peak in May 2008 (4). More detailed monthly reports for these overall Chinese pig production and price characteristics are now provided on an agribusiness website (www.soozhu.com).

Figures on the actual cost of production (COP) for the same periods are not widely available. The average corn prices in China are published but only reflect a part of the COP of raising pigs. The feed price for fully finished pig feed (with corn, soybean, additives, etc.) is usually 2 RMB to 3 RMB per kg in China, with a current average of approximately 2.6 RMB. If we then assume an average pig eats 250 kg of feed between the ages of weaning and slaughter (when it goes from 10 kg bodyweight at weaning up to 110 kg bodyweight at slaughter), then the average feed costs per pig will be approximately 650 RMB. The average non-feed costs (facilities, buildings, staff, etc.) per pig in China are considered to be around 60 RMB per pig (the cost of replacing one pig space). With these extra non-feed costs the actual COP will therefore generally range from 7 RMB to 12 RMB per kilogram of finisher pig,

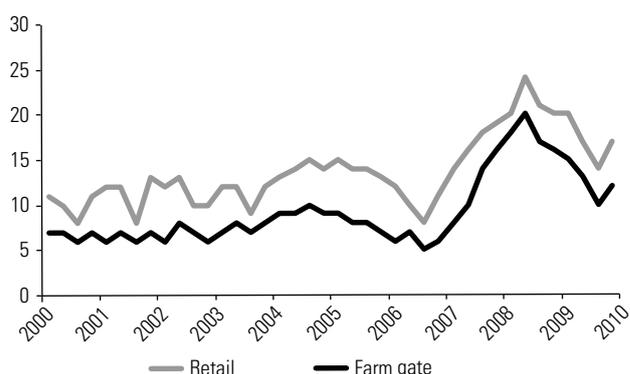


Fig. 2
Pork farm-gate and retail prices in China from 2000 to 2009
 Shown in renminbi (RMB)/kg
 6.6 RMB = US\$1

depending on the varying costs of cereal and soybean feed ingredients. This means that the actual profit levels for pig farming have varied from zero to several hundred RMB per pig marketed in the past decade.

Obvious problems occur with more detailed interpretation of the basic figures shown in Figure 2. They are average figures across the entire Chinese industry, which is not a homogenous one; the costs and supply issues for each sector (backyard or intensive) vary widely. Pork prices also tend to be 10% to 30% higher in the south-eastern and mid-eastern provinces around the cities of Guangzhou and Shanghai. These provinces have a greater percentage of large commercial farms, with higher costs/prices all along the pork chain.

Table I
An estimate of the comparative size and expansion of some of the larger pig producers in China

Producer and farm location	Number of sows March 2008	Number of sows March 2011	Main market supplied
Wens Family Farms, Guangdong	110,000	350,000	Guangdong
LuoNiuShan, Hainan	20,000	60,000	Hainan
Muyuan, Henan	11,000	50,000	Henan, Shanghai
Charoen Pokphand*	25,000	50,000	Guangdong, Sichuan
Zhengbang, Jiangxi	9,000	45,000	Guangdong
Long River, Guangdong	22,000	16,000	Guangdong, Hong Kong
New Wellfull, Hunan	28,000	30,000	Hunan
COFCO, Jiangsu	5,000	30,000	Jiangsu, Tianjin
New Hope Farms, Sichuan	3,500	20,000	Sichuan
Agfeed, Guangxi	13,000	18,000	Guangxi, Jiangxi
Shuanghui Group, Henan	10,000	16,000	Henan, Shanghai
Longda Foods, Shandong	5,000	13,000	Tianjin

* nationwide locations

Responses to recent pig farming issues

Because of the prominent position of pork in Chinese society and its major contribution to the inflation index, the government has focused attention on developing effective responses to the pig health, supply and price issues of the past decade. Over the last ten years Chinese authorities at federal, provincial and local level have announced and instigated a range of measures to assist pig farmers. These have aimed to stabilise farm profits and the supply of affordable pork. The measures have included insurance for farm breeder stock, direct subsidies for farm expansions and breeding programmes, subsidies for boar semen use, free supplies of CSF and killed PRRS vaccines, and farm taxation exemptions and allowances. All these measures are helpful for small and large commercial farm operations. Specific examples of the measures that have been introduced include a federal insurance regulatory commission for sow deaths (a fee of approximately 50 RMB per sow pays out 1,000 RMB per head if collected on sow death), a direct sow subsidy that offers 100 RMB for any producer buying a new sow, and other subsidies for large-scale breeding farms. One of the most effective measures is timely compensation (200 RMB per piglet and 600 RMB per finisher pig) for culling diseased pigs delivered to veterinary stations (15).

The numbers of breeding females have been increased in both the semi-governmental pig farming facilities (central, provincial and county) and the breeder farms of private pig farming partnership groups such as the Wens Farms, the Pig International Company and the Thai Charoen Pokphand Group, which are all trying to increase their stock count. Imports of breeding female pigs from the United States rose from a previous annual limit of 2,000 to 7,036 breeders in 2008. Imports of western pork arranged through Chinese government agencies rose rapidly (116%) in 2007 and 2008 to address retail shortages. The clear increase in Chinese breeding pig capacity (see Table I) is likely to dampen any need for further imports.

Current structure of pig farming in China

Besides differing farm types (backyard, commercial), there are two basic sets of pig farm structures in China. The first set consists of government-operated breeder farms that supply local farms. The Chinese government operates numerous breeder farms arranged in a wide network on federal, provincial and county levels, which then supply pigs to smaller local producer farms. For example, the

federal Beijing Breeding Swine Centre has five farms of 600 sows each, providing live western-breed breeders (80 kg to 130 kg) as grandparent stock or production sows. Similarly, the provincial Shinxin pig breeding farms (Beijing Province) are a set of five large sow breeder farms (1,400 to 2,100 sows) providing sows to county and provincial farms locally and across China. The local county farms are usually single-site 500 to 1,000 sow breeder farms, which generally only supply production breeder sows or boars to local farms.

In China, all these various levels of government breeder farms typically operate on a single-site farrow-to-finish farm system and are usually located in pig-dense areas; therefore, there is limited age-group separation and disease control can be difficult. There has also been a wide range of incoming breeder pigs of differing origins, with various western-breed pigs from Europe and the United States entering these farms in the past decade.

The production farms supplied from these government pig breeder farms are typically small commercial or backyard farms with between 5 and 40 sows and on-site finishing. The wide on-farm use of the relevant genetic imports (Landrace, Large White, Duroc breeds) means that pig growth rates, sow fertility, meat quality and feed conversion figures are now comparable to western levels (assuming comparable feed and husbandry inputs). However, the farm performance for these Chinese farm systems is typically only 12 to 18 pigs per sow per year; the main reason for this lower overall performance is probably higher levels of young pig mortality, which is commonly above 10% in all regions (4).

The second type of pig farm structure in China is that of private or semi-private farms. The inevitable consolidation of pig farming that occurred after periods of low profitability (see Figs 1 & 2) has led to a more mature private industry structure with several large farm systems operating modern two-site systems. Larger farms are considered more resilient to transient costs and to price issues; some major systems and their sizes (in both March 2008 and March 2011) are listed in Table I. It is now estimated that there are over 100 farm groups in China with over 10,000 sows each. Many of these farms were originally located in the south and east of China, because of the proximity of these regions to more affluent lean-pork markets, such as Shanghai and Guangzhou. The Wens Group operates a set of approximately 60 breeder farms supplying over 5,000 separate finisher sites (see www.wens.com.cn). Slaughterhouse locations close to these south-eastern farms means that there are better returns on investments, despite the need to transport pig feed from the north of China and/or from port facilities. There has also been growth in larger farms in the central and north-east provinces; for example, the New Hope Group has an active expansion programme in Sichuan.

These farms have more available land for expansion projects and are usually closer to the major cereal crop production areas in China. The lower pig density in those areas is also thought to confer a disease control advantage. However, these farms and their associated slaughter plants can sometimes be a long way from large affluent markets for pork.

Despite the growing demand for leaner pork, the native fatty pork market should not be underestimated. Xiang roaster pigs, Jinhua hams and fatty pork cuts retain a notable presence in stores and restaurants throughout China, with over three million hams derived from Jinhua pigs alone sold annually. There are around 300,000 TaiHu sows in Jiangsu Province, which is 20% of all sows raised in that province. Native breed sows are also cross-bred to form new lines, such as a TaiHu/Duroc cross-production pig line. The latter has proved to be a popular cross-breed, with much improved weight gain (body weight at six months is 86 kg), reduced back-fat and improved lean carcass percentage (8). The widespread backyard farm segment in China tends to produce many fatty local-breed pigs, sold to local markets, especially in more rural areas (Fig. 3). However, these native pig breeds have generally not formed part of recent expansion/consolidations, probably due to their lower prices and slower growth rates. The Chinese government has pioneered excellent conservation efforts for many of the rarer native breeds.

Challenges for modern pig farming in China

Pig farming globally faces challenges related to shortages and rising prices of common feed components, particularly corn and soybeans, as they are diverted to biofuel



Fig. 3
Rural market trader in Jiangxi Province selling fresh cuts of native fatty pork

production. Pig farming worldwide also faces increasing government oversight and rising costs related to slurry disposal and potential environmental issues. There are several further challenges more specific to current pig farming in China, some of which are further explained here.

a) As mentioned, large Chinese farms often have a farrow-to-finish system with limited quarantine or farm isolation for new pigs and no age separation on site. Therefore, viral diseases, including three viruses with a possible immunosuppressive effect, namely, PRRS virus, PCV2 and CSF virus, may enter the farm from various sources and then circulate actively in three- to ten-week-old weaners. On-farm breeder pigs can easily come into contact with these viruses, which can subsequently be spread to new farms. This circulation leads to a high level of virus spread, virus persistence, viral mutations and on-farm impact of primary and secondary infections. The potential positive impact of measures such as vaccination or improved hygiene is likely to be greatly limited as long as this basic farm structure remains. Despite these issues, single-site farm systems have been traditionally favoured because of land usage issues.

b) Both CSF and foot and mouth (FMD) viruses (serotypes O and Asia 1) are widespread and endemic in pigs in China (11, 13, 14). Vaccines for these two notifiable diseases are manufactured and delivered free by government authorities and imported vaccines are not permitted. There are approximately 70 licensed animal vaccine manufacturers in China, including both semi-governmental and private manufacturers. The CSF vaccine favoured in China is the lapinised C strain virus (13). Since the disease outbreaks in 2006 and 2007, there has been a rise in the number of both CSF and PRRS vaccine manufacturers, up to 9 and 21, respectively. There are issues of variable titre and potency with both the CSF and killed PRRS vaccines (13, 16). For these three viruses, CSF, PRRS and FMD, vaccination may not offer full protection from infection or disease even when fully applied to pigs of the appropriate ages, particularly on single-site farms with pigs of differing ages mixing on one site (9, 13).

c) The level of relevant training and expertise (people/language skills, experience, education) of farm managers and attendant veterinarians is often low, particularly in northern China (1). This is a major problem, even on farms with considerable investment and expansion. Similarly, very few provincial veterinary laboratories can offer pig farmers services in the basic disciplines of pathology, microbiology and epidemiology (1). This lack of suitable diagnostic ability can affect the extent and duration of disease outbreaks and on the overall level of education and training available to farms.

d) One particular challenge facing pig farming in China is the lack of a distinctive voice in terms of a national and

independent farmer-led socio-economic organisation (such as a National Pork Producers' Council or a National Farmers' Union). This has a number of knock-on effects. For example, the typical figures for farm costs/prices are analysed by central administrators only and there is no clear voice on the need for suitable vaccine quality in local or imported vaccines and the need for suitable veterinary laboratories at provincial level. A single voice would facilitate independent and accredited training programmes aimed at farm management and disease control measures. Similarly, if there were a single voice, global challenges to the pig industry, such as the threat of introduction of African swine fever via African trade (2), would be fully conveyed to all interested parties in China. ■

Conclusion

Chinese pig production is now recovering from a series of cyclical profit and loss periods and from the impacts of viruses and natural disasters, but there are great opportunities for continued growth. China must maintain a high level of pig farming activity and the industry must continue to prosper if the country is to provide a secure supply of the preferred meat of its expanding urban population. ■

Modernisation du secteur de l'élevage porcin en République populaire de Chine : croissance et défis pour la santé animale

S. McOrist, K. Khampee & A. Guo

Résumé

En République populaire de Chine, les cycles de production excédentaire et d'absence de rentabilité ont incité le secteur de l'industrie porcine à procéder à des regroupements, ce qui a entraîné la disparition des exploitations de taille plus modeste. En 2007, la production porcine a encore décliné suite à la survenue de foyers de la « maladie des oreilles bleues », un complexe sanitaire constitué par l'association du syndrome dysgénésique et respiratoire du porc à forte virulence, de l'infection à circovirus porcin et de la peste porcine classique. D'après les estimations les plus optimistes, le nombre de porcs atteints s'est élevé à 50 millions. Plus récemment, des catastrophes naturelles (tremblements de terre et froids hivernaux extrêmes) ont également réduit la production porcine dans certaines régions. Aujourd'hui, la croissance globale du cheptel chinois de porcs reproducteurs se poursuit rapidement et devrait suffire à satisfaire l'augmentation annuelle escomptée de 7 % de la demande en viande porcine. Les prix élevés des aliments pour animaux (céréales et soja) continuent à grever les coûts de production. Depuis une dizaine d'années, les pouvoirs publics ont introduit un certain nombre de mesures visant à aider le secteur, en particulier des dispositifs d'assurance du cheptel reproducteur, des aides directes aux exploitations qui s'agrandissent et aux programmes d'élevage, des distributions gratuites de certains vaccins et des exonérations fiscales. D'autres problèmes spécifiques doivent encore être résolus : il s'agit notamment de la propagation rapide, de la persistance et des conséquences pour les exploitations de certaines affections virales sévissant dans les systèmes d'élevage mono-site ; des variations de titrage et d'efficacité de certains vaccins produits localement ; des capacités techniques limitées des laboratoires et de l'absence de formation et d'expertise du personnel travaillant dans les exploitations ; enfin, de l'absence d'une organisation représentant spécifiquement les éleveurs de porcs.

Mots-clés

Élevage familial – Élevage porcin – Entreprise porcine de type naisseur-engraisseur – Exploitation commerciale – Peste porcine classique – République populaire de Chine – Syndrome dysgénésique et respiratoire du porc – Système d'élevage. ■

Porcicultura moderna en la República Popular China: crecimiento y problemas veterinarios

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Resumen

En la República Popular China, la repetición cíclica de situaciones de exceso de oferta y déficit de rentabilidad ha inducido procesos de concentración de la industria porcícola, lo que ha ido dejando fuera del sector a un gran número de pequeños productores. En 2007, la oferta de productos porcinos cayó debido a brotes de fiebre alta por la enfermedad de la oreja azul, compleja afección en la que se combinan una forma muy virulenta del síndrome disgenésico y reproductivo porcino, un circovirus porcino y la peste porcina clásica. Las estimaciones más exactas cifran en unos 50 millones el número de cerdos afectados. Últimamente la producción porcina también se ha visto mermada en ciertas zonas a causa de desastres naturales (terremotos, heladas invernales). A día de hoy sigue aumentando a buen ritmo la cabaña reproductora china, que seguramente bastará para cubrir el aumento previsto de la demanda de cerdo, estimado en un 7% anual. Los elevados precios de los ingredientes de los piensos (cereales y soja) siguen planteando problemas porque inciden en los costos de producción. Las autoridades han aplicado muchas medidas útiles en el último decenio, en particular el aseguramiento de las piaras reproductoras, subvenciones directas a la ampliación de explotaciones y a programas de reproducción, suministro gratuito de ciertas vacunas y exenciones fiscales. Subsisten todavía una serie de problemas específicos: elevados niveles de propagación, persistencia e impacto en las granjas de importantes infecciones víricas en el caso de sistemas de producción concentrados en un solo emplazamiento; oscilaciones en título y potencia de algunas vacunas de fabricación local; escasa capacidad técnica de los laboratorios; falta de formación y competencia técnica del personal de las explotaciones; e inexistencia de una instancia claramente definida como representante y portavoz del sector porcícola.

Palabras clave

Explotación de ciclo cerrado – Granja familiar – Granja industrial – Peste porcina clásica – Porcicultura – República Popular China – Síndrome disgenésico y respiratorio porcino – Sistema de producción animal.

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