

The emerging animal health delivery system in the People's Republic of China

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Summary

Livestock production in the People's Republic of China has expanded at an unprecedented rate over the last decade and this trend is expected to continue into the foreseeable future. Government and private sector investment supports this growth, and the fact that small farmers are incorporating more animal husbandry into their work is expected to mitigate some of the concerns over recent World Trade Organization accession, particularly in the more precarious grain growing regions. Modernisation and intensification of the livestock industry in the People's Republic of China is subject to significant risks as regards both infectious and production-related diseases and within the framework of food safety and public health challenges. Although historically, the veterinary service system in the People's Republic of China has been successful in the eradication and control of major disease outbreaks, domestic and international market concerns are providing the catalyst for significant reforms in the animal health delivery system in the country. This paper provides an overview of the existing veterinary system in terms of the education and qualifications of veterinary personnel, delivery mechanisms, and future approaches to reforming the system in the context of a dynamic livestock industry in transition.

Keywords

Animal health – Livestock production – Qualification – The People's Republic of China – Veterinary education – Veterinary reform – Veterinary Service.

Livestock in the People's Republic of China

The People's Republic of China has experienced a period of rapid economic growth over the past decade and livestock production has increased at the same rate, a trend which is expected to continue into the foreseeable future (1, 3). Institutional reform and government promotional programmes have been the primary catalysts for this change, but concurrent expansion of the feed industry and technical progress in animal breeding and animal health have also contributed to this unprecedented growth (7, 10). More recently, the accession of the People's Republic of China to the World Trade Organization (WTO) has created uncertainties in the more precarious grain growing areas of the country and expanding into value-added animal husbandry commodities is seen as a way to mitigate these concerns. This emphasis on livestock is further supported

by rapid urbanisation and growing consumer demand for meat, eggs and dairy products (Table I). These changes are commonly observed as per capita incomes increase. The majority of the increase in demand for domestic grain in the People's Republic of China will be for livestock rather than human consumption; animals already account for more than 50% of total grain consumption, as reflected in current annual concentrate feed production estimates, which are in excess of 75 million tonnes.

Most livestock production in the People's Republic of China is provided through smallholder farms and, despite being based on the feeding of crop residues and by-products rather than improved concentrate feeds, is relatively efficient (Table II). All indications are that livestock production will continue to expand at the current rate of 6%-10% per year and this will require the support of an effective veterinary service and national disease control programmes (1, 5, 8, 11).

Table I
The top meat producing countries in the world in 2000 (million tonnes)

Country	Total meat	Beef	Pork	Poultry	Other
The People's Republic of China	62.5	5.4	42.0	12.0	3.1
The United States of America	37.5	12.3	8.5	16.0	0.7
European Union	36.7	7.4	17.8	9.0	2.5
Brazil	14.5	6.5	1.8	6.0	0.2
India	4.8	2.9	0.6	0.6	0.7
Mexico	4.5	1.4	1.0	2.0	0.1
Russia	4.3	2.1	1.3	0.7	0.2
Argentina	4.1	2.8	0.2	1.0	0.1
Canada	4.1	1.3	1.7	1.1	0.0
Others	61.1	17.9	16.4	18.6	8.2
Total	234.1	60.0	91.3	67.0	15.8

Table II
Average number of livestock per household on a national and regional basis

Region	Average number of livestock per holding			
	Cattle	Dairy cows	Breeding sows	Chickens
Northern	3	13	3	63
North-western	3	3	2	17
North-eastern	3	5	1	33
Eastern	1	11	1	27
Central-southern	2	5	1	22
South-western	2	5	1	8
National	3	4	1	19

Source: National Agricultural Census Office of the People's Republic of China (1999)

The livestock sector is already very large: 50% of pork production world-wide takes place in the People's Republic of China and pork accounts for 60% of domestic meat consumption (11). The sector is still primarily based on small-scale household production units and approximately 65% of pork production is derived from households with less than five pigs each. Large-scale, intensive production units are being built in the face of increasing demand and a lack of land resources into which to expand smallholder production. Similar trends are reflected in the poultry industry, the rapidly expanding dairy industry and the cattle and small ruminants production industries (Table III). Although pork production continues to increase and is the most prominent livestock commodity produced in the People's Republic of China, the share of pork as a proportion of total production is gradually being displaced by poultry, eggs and milk. This growth will probably continue to develop into a significant environmental concern as effluent discharges from intensive production units are one of the most serious constraints to expanded production.

Equally prominent concerns are related to animal health and the diseases that place farmers and their domestic and export markets at risk (5, 7, 8).

The diverse and dispersed smallholder-based livestock production system creates unique challenges and an efficient Veterinary Service is critical to the sustainability of a viable industry. Recent accession to the WTO combined with food safety and public health concerns have raised consumer awareness and further exacerbated the risks to the domestic and international markets for livestock producers in the People's Republic of China (9). An efficient, reliable veterinary service and a transparent animal health information and reporting system are vital if the industry is to continue growing at its current pace.

Animal health service systems

The food animal veterinary services in the People's Republic of China are primarily delivered through government organisations as a public good. Private veterinarians are becoming more prominent in close association with larger production farms in the poultry and swine sectors and agribusinesses (feed mills, processors, etc.), either as employees or service providers to farmers that deliver to supply chain managers. Dog and cat ownership is severely controlled in the People's Republic of China through strict licensing requirements, but commercialised pet animal veterinary clinics are becoming more common in urban areas. These clinics are usually affiliated with veterinary faculties or animal husbandry bureaus, but to meet the demand, foreign-trained veterinarians are seizing the opportunity and they too are establishing veterinary clinics in large centres to provide services to companion animal owners.

The People's Republic of China is now a member of the WTO and the next step in the normalisation of trade is to resolve the issues surrounding its participation in the OIE (World organisation for animal health). The People's Republic of China is striving to meet the criteria for an internationally recognised Veterinary Service, many of which involve changes to the structure and function of the profession. The Animal Husbandry and Veterinary Department of the Ministry of Agriculture (MOA) has identified as a priority the reform of the veterinary profession and the delivery of veterinary services throughout the country to achieve consistency with international standards for animal health status. A number of international donors, including Canada (Canadian International Development Agency) and Germany (*Deutsche Gesellschaft für Technische Zusammenarbeit*) are supporting this effort.

The present Veterinary Service structure is characterised by a high degree of discipline and motivation on the part of the staff,

Table III
Trends in livestock production in the People's Republic of China (million tonnes)

Year	Meat total	Pork	Beef	Mutton	Poultry	Other meat	Eggs	Milk
1980	13.08	11.34	0.27	0.44	1.00	0.03	2.57	1.37
1985	19.27	16.55	0.47	0.59	1.60	0.06	5.35	2.89
1990	28.57	22.81	1.26	1.07	3.23	0.10	7.95	4.75
1995	52.60	36.48	4.15	2.02	9.35	0.27	16.77	6.73
1999	59.49	40.06	5.05	2.51	11.15	0.72	21.34	7.18
2000	61.25	40.31	5.33	2.74	12.04	0.83	22.43	9.19
2001	63.34	41.84	5.49	2.93	12.10	0.98	23.37	11.23
Increase in production								
1980-1990	218%	201%	468%	241%	323%	333%	309%	347%
1991-1999	208%	176%	401%	235%	345%	720%	268%	151%

especially when confronted with potentially disastrous animal health problems. This has enabled the Service to achieve some notable successes in infectious disease control in spite of limited resources. These include the eradication of rinderpest in 1955 and contagious bovine pleuropneumonia in 1970 (13). The Veterinary Service has also been successful in reducing the prevalence of a range of other diseases, including foot and mouth disease, in the face of sporadic outbreaks. However, the MOA was recently cited as reporting that given the vast size of the country and its still-developing disease reporting systems, the People's Republic of China is vulnerable to specific diseases such as highly pathogenic avian influenza. In addition, the public has limited knowledge about these diseases and the ways of preventing them (17). Veterinary services in the People's Republic of China are essentially provided as a public good, although the approach and delivery system is being reformed as the livestock industry becomes more progressive and seeks efficient mechanisms to reduce the risk associated with production-related diseases.

Responsibility for the delivery of animal health services and disease control is essentially divided between the MOA, responsible for domestic veterinary issues, and the Administration for Quality Supervision Inspection and Quarantine (AQSIQ), a division of which oversees animal health services related to quarantine and imports and exports of livestock and animal products. There is also some overlap of domestic responsibility in that inter-provincial meat inspection is carried out by the AQSIQ, with this Service also providing support in inter-provincial trade and domestic food safety issues (13, 14, 15). The newly established State Food and Drug Administration (SFDA) is also involved in the Veterinary Service system, because it too deals with issues related to animal health and meat inspection and is responsible for harmonising drug use, residue detection and food safety with international standards. The SFDA has a hierarchical organisation with representation, technical staff and laboratories at national and provincial levels.

The delivery of veterinary services under the MOA is managed by the Animal Husbandry and Veterinary Department through operational institutions such as the National Animal Husbandry and Veterinary Service (NAHVS). The NAHVS operates programmes through a network of 'centres' and 'stations' at national, provincial, municipal, county and township levels (12). These animal husbandry stations are given technical guidance and direction through the institutional system, but are administered and receive their operational budgets through the local government. Exceptions to this approach occur when specific programmes such as vaccination campaigns are funded and directed by provincial or regional governments. In such cases, the vaccines are generally provided free of charge as a public good, but the administration of the vaccine may require a nominal fee-for-service paid by the farmers to the field staff to cover expenses. In the more market-orientated or fully commercial livestock operations, remuneration for extension staff, including animal health workers, may include bonuses, linked to production goals or annual output, from contracted village-based producers (4).

On-farm delivery of animal health services is traditionally provided by the township animal husbandry station technical staff, who often lack formal training but who have combined responsibility for disease prevention, inspection, quarantine, regulatory veterinary medicine, treatment, and livestock improvement programmes. These workers are assisted in their work by the more qualified technical staff at county or provincial level when necessary (1).

Although determining the total number of animal health workers in the People's Republic of China is difficult, they constitute a significant proportion of the estimated more than one million extension workers based in counties and townships throughout the country. An estimate based on the distribution of a full complement of grassroots staff in the county and township stations would place approximately 250,000 animal health workers at this level. Village animal health services may also include practitioners of traditional Chinese veterinary

medicine who can trace their origins through ancient Chinese history. Indeed, ethnoveterinary medicine may still be the first recourse for many small farmers in more remote areas where government technical staff are not readily available (6).

Veterinarians in the People's Republic of China fulfil a variety of functions in their capacity as government regulatory veterinarians or in the service of a rapidly emerging commercial agribusiness sector. In some cases these functions may overlap, particularly at the county or township level: government staff may perform a regulatory function and may also provide services to producers for a fee. Regulatory or government animal health staff are usually employed from the county level through to the national level and those at the provincial level and above are qualified with a recognised veterinary degree. Animal health workers at the township level, on the other hand, depend on intermittent vaccination campaigns and other sources of income, including the sale of feed, drugs and antibiotics to farmers.

Service fees for animal health workers tend to be highly variable depending on the geographical location, the technical or professional qualification of the service provider and the scale of the production unit, which can range from backyard farmers and smallholders to larger intensive industrialised operations. Anecdotal evidence indicates that respected veterinary professors may receive up to RMB500 (US\$60) per day for consulting services on larger farms and up to RMB100 (US\$12) per hour to provide technical training. For the smaller production units, the routine multiple vaccination programmes for swine, for example, is usually covered by an annual fee (i.e. RMB4.5 [US\$0.54] per year per pig in Hebei). In some areas where animal health services are provided by private veterinarians, the annual cost may reach RMB30 (US\$3.60) per pig and in the more prosperous areas, up to 50% of the animal health services to smallholder producers may be provided by these privatised animal health workers (2). In Shaanxi Province, for example, farmers have been reported to pay animal health technicians a service fee of RMB5.0 (US\$0.60) per head to administer vaccines to dairy cows and RMB3.0 (US\$0.36) for beef cattle (T. Hunt, personal communication).

Private veterinarians are becoming more prominent and usually work at the farm, village and township level. Some work for State farms and industrial farms or are employed by commercial operations (feed mills, poultry producers, dairy processors, etc.). The emergence of private veterinarians is usually associated with regions and sectors of the livestock industry that are market-driven and can profitably justify the value-added investment in the prevention of production related diseases, whereas, reportable or infectious diseases tend to be the preoccupation of the traditional government regulatory Veterinary Service. Some private animal health workers have veterinary degrees, but many do not have any formal veterinary education.

Recently, provincial jurisdictions have established certification and registration systems for veterinary professionals. Veterinarians receive training and then sit an examination prior to certification that is similar to that taken by artificial insemination technicians, meat inspectors and feed laboratory technicians. Some provinces provide clinical or diagnostic certification and registration that allows veterinarians to operate a clinic in accordance with national regulations. On a similar note, the recently enacted Animal Epidemic Prevention Law provides for clinical certification but is subject to provincial interpretation and its enforcement and associated regulations are currently being developed.

The animal health service system in the People's Republic of China is supported by more than twenty national level animal disease research institutes, many under the authority of the MOA. There are six national level veterinary reference laboratories located throughout the country, including a high security (level P3) infectious disease centre located in Shandong Province. This centre also provides resources and technical support for the national veterinary epidemiology and animal disease information system. A number of university and larger provincial laboratories are also recognised as providing reliable diagnostic reference services. Field veterinarians are supported with diagnostic services through a network of provincial level laboratories that usually provide a reasonable level of service and other, less reliable, poorly equipped laboratories at the municipal and county level. There are some minor regional differences in approaches to the delivery of veterinary services but taken together, they represent a full spectrum from grassroots animal health workers and technicians in the remote western regions to a more progressive and sophisticated delivery system in the developed, central and eastern regions of the country and in proximity to urban centres.

Veterinary education

The internationally accepted definition of a veterinarian is a person trained and authorised to practice veterinary medicine and surgery in a profession deemed to be a calling or vocation and requiring specialised knowledge, methods and skills as well as preparation in an institute of higher learning. The profession maintains and polices a code of ethics and manages a professional organisation; a large majority of the profession are members of this organisation and they are committed to continuing study and placing service above personal gain (1).

Several different levels are recognised for veterinarians and veterinary technicians in the People's Republic of China, as follows:

- researcher/professor
- senior veterinary specialist
- veterinary specialist

- assistant/junior veterinary specialist
- technician.

Educational requirements for animal health workers vary throughout the People's Republic of China but essentially consist of alternative courses of formal and non-formal preparation to achieve the required level of qualification; this is typical of the approach to professional development in the agricultural sector. Designations and qualifications have evolved to fit historical needs in the People's Republic of China and the limited formal and scientific background of the veterinary and extension staff of the country may not be adequate for addressing the emerging need for the rapid technological advances and innovations that are required to mitigate the risks to the livestock industry, public health and food safety.

Individuals may qualify as veterinarians through formal university education consisting of a four-year degree programme. The curriculum for the first two years primarily focuses on animal husbandry, followed by two years of more specialised animal health topics. Upon graduation, the individual may then obtain further qualifications, subject to provincial variation and interpretation, as follows:

- a) assistant or junior veterinary specialist after one year of experience
- b) veterinary specialist after four to five years of experience; this qualification is based on computer skills, English language skills, completion of an official examination and publication of papers and research
- c) senior veterinary specialist following five additional years of experience; this qualification requires improved computer and English language skills, completion of an official examination and publication of at least two more papers
- d) veterinary professor following five additional years of experience.

Another avenue for qualification as a veterinarian is through designated technical agro-vocational high schools and colleges. Technical school graduates complete a two or three year course of study in animal husbandry with specialisation in animal health. Upon completion, graduates are able to qualify as veterinary specialists through a series of steps, as follows:

- a) veterinary technician after one year of experience
- b) veterinary assistant or junior specialist after five years of experience with the possibility of operating a clinic on a fee-for-service basis. This level is essentially the same as that of a veterinary degree graduate
- c) veterinary specialist after an additional five years of experience

d) senior veterinary specialist; this level of qualification is very difficult for technical school graduates to achieve.

Individuals may also qualify as veterinary technicians through work experience and with little or no formal specialised veterinary education (Animal Husbandry and Veterinary Services Department, MOA, personal communication).

Reform of veterinary services and development of the livestock industry

Although the World Veterinary Association recommends a minimum of a full four-year veterinary curriculum, many of the on-farm animal health workers in the People's Republic of China do not meet this criterion and diagnostic capability and service delivery is too limited to meet the burgeoning demands of the industry. The veterinary profession in the People's Republic of China lacks a recognised structured association with sufficient autonomy to provide licenses, inspection and guidelines for continuing education and to help address the following issues:

- diagnostic laboratories in the People's Republic of China, out of necessity, are preoccupied with infectious diseases, whereas an industry-orientated service might provide expanded services to address production-related disease constraints
- disease surveillance is a critical concern for the Government of the People's Republic of China and considerable effort and public investment is being directed to the development of a reliable, internationally recognised disease information system based on sound epidemiological principles
- veterinary drug outlets are licensed by government veterinary stations but veterinary training is not required to market drugs. Inappropriate use of antibiotics and other drugs has become a growing concern in the context of food safety and public health risks. Vaccines for the control of contagious diseases are controlled and distributed by veterinary stations; routine vaccination and periodic campaigns are administered by the stations and private veterinarians under contract.

The future of veterinary services in the People's Republic of China

The MOA, in recognition of the constraints facing the effective delivery of veterinary services, is undertaking drastic reforms to

resolve the situation and ensure that these services are provided by well-qualified veterinary staff. More specifically, the MOA is:

- a) in the process of establishing a Veterinary Bureau and appointing a Chief Veterinary Officer (16)
- b) framing a reform plan for the management of the veterinary sector to increase funds to fight animal diseases and revise the provisions for the control of animal disease outbreaks
- c) developing legislation and policies to provide a framework for the regulation of private practitioners
- d) developing certification procedures and regulations for specific veterinary disciplines and areas of specialisation
- e) establishing a system for the certification of qualified private veterinarians that includes training and improving the skills of these practitioners. This approach is being implemented in more than forty testing centres throughout the country, many of which are affiliated with recognised universities.

The People's Republic of China has also invested heavily in the implementation of a number of regional programmes to establish disease-free zones based on specific livestock

commodity densities and geographical criteria (8). Ultimately, these zones are expected to produce livestock and animal products that meet the animal health status requirements for trading partners and the international marketplace.

The next decade will give rise to major changes in the quality of training of veterinarians and the delivery of veterinary services in the People's Republic of China. The country has made an effort to carefully study veterinary service systems throughout the world and is in the process of adapting and adopting the most appropriate elements to enhance its own services and disease control programmes. The expected transition from smallholder production to larger, more intensified livestock agribusinesses over the next two decades combined with rural urbanisation will increase the demand for more qualified animal health professionals and provide a further catalyst for the proposed reforms in the veterinary profession.

Émergence d'un système de prestation de services de santé animale en République populaire de Chine

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Résumé

La production animale en République populaire de Chine s'est développée à un rythme sans précédent depuis la dernière décennie, et cet essor devrait se poursuivre dans un avenir prévisible. Les investissements des secteurs public et privé appuient cette croissance ainsi que la transition des petits fermiers vers un système d'élevage plus structuré. On peut espérer que cela répondra aux préoccupations nées de l'adhésion récente à l'Organisation mondiale du commerce, particulièrement dans les régions productrices de céréales les plus défavorisées. La modernisation et l'intensification de l'industrie animale en République populaire de Chine entraînent des risques importants de maladies infectieuses et de maladies liées aux méthodes de production, et ceci dans le contexte des défis que posent la sécurité sanitaire des aliments et la santé publique. Bien qu'historiquement le système des services vétérinaires se soit avéré efficace en République populaire de Chine pour éradiquer et contrôler les foyers de maladies les plus graves, les préoccupations des marchés nationaux et internationaux servent de catalyseur aux réformes importantes du système national de prestation de services. Cet article présente un aperçu du système vétérinaire existant en ce qui a trait à la formation et aux titres de qualification du personnel et aux mécanismes de prestation de services, ainsi que les approches futures en vue de réformer le système dans le contexte d'une industrie animale dynamique en transition.

Mots-clés

Éducation vétérinaire – Production animale – Qualification – Réforme vétérinaire – République populaire de Chine – Santé animale – Service vétérinaire.

El naciente sistema de prestación de servicios de sanidad animal de la República Popular de China

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Resumen

En la República Popular de China, la producción ganadera creció a un ritmo sin precedentes en el curso de la última década, tendencia que, hasta donde cabe prever, se mantendrá en el futuro. Las inversiones del sector público y el privado apoyan este crecimiento, y se piensa que la transición que llevará a explotaciones minifundistas a asumir un mayor volumen de producción animal servirá para atenuar algunas de las inquietudes que suscita la reciente entrada de China en la Organización Mundial del Comercio, sobre todo en las regiones de cultivo cerealero, que son especialmente frágiles. Sobre el proceso de modernización e intensificación de la industria pecuaria china planean considerables riesgos de salud pública y salubridad de los alimentos, derivados de enfermedades tanto infecciosas como relacionadas con la producción. Aunque históricamente el sistema de servicios veterinarios chino ha logrado erradicar y controlar importantes brotes de enfermedad, las preocupaciones del mercado nacional e internacional están sirviendo para catalizar importantes reformas del sistema de prestación de servicios zoonosológicos del país. Los autores describen a grandes rasgos el sistema veterinario vigente por lo que respecta a la enseñanza, la titulación, los mecanismos de prestación de servicios y los planes de reforma en el contexto de un sector agropecuario dinámico y en plena transición.

Palabras clave

Enseñanza veterinaria – Producción ganadera – Reforma veterinaria – República Popular de China – Sanidad animal – Servicio veterinario – Titulación.



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