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Estimation and Forecast of the Possible Position Numbers for Licensed Veterinarian in China

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ABSTRACT

China will fully put the system of licensed veterinarian in practice in 2017 but we still didn't know how many veterinarians which were the essential requirement for it. We investigated the possible veterinary position numbers depending on the demand of animal hospital, animal industry, veterinary pharmaceuticals and device industry, animal feeds industry and wild animal protection in China. The results showed that China needed 173,651 veterinary position numbers in 2011. Thereinto, veterinary service organization and animal husbandry respectively occurred 74,409 (42.08%) and 102,434 (57.92%). Furthered, we predicted that the veterinary position numbers will increase by the average annual incremental rate of 11.58% and be up to 292,076 in 2017, including 144,526 (49.48%) position numbers in veterinary service organization and 147,550 (50.52%) in animal husbandry. In case of the low passing rate of the national examination for licensed veterinarian, qualified veterinarian mainly employed in central cities and in governmental office or institute, an obvious shortage of veterinarian was still existed at present. More excellent policy should be performed by Chinese government for the fully scale practice of licensed veterinarian's system.

Key words: Veterinary position number, China, 2011, 2017

INTRODUCTION

Effective veterinary system needs enough qualified veterinarian (OIE, 2011, 2012). China had set up the regime of licensed veterinarian and created the relative examination in 2009 and originally hoped to perform the licensed veterinary system in 2014. Whereas, only about 50,000 persons got the qualification of licensed veterinarian till to 2012. With the little number, the Ministry of Agriculture of the People's Republic of China changed the schedule and planned to completely take the system in practice in 2017. Notwithstanding, Chinese government and people still worry about the possibility of the full scale operation of veterinary system, because they didn't know the precise human resources of veterinarian. Allowing for that the veterinarians servicing in government functional branch do not need the qualification of veterinarian at present, we only considered the possible position numbers in veterinary service organization (clinic, hospital and Public veterinary service station) and animal husbandry (animal farm, veterinary pharmaceuticals and device industry, animal feeds industry and wild animal protection) which need licensed veterinarians according to the laws for animal health in China. To further evaluate the reliability of above data, we calculated the possible licensed veterinarian position numbers in China based on

the level of veterinarian rate with population in America, British, Japan, Australia and Canada and analyzed their concordance. Forever, the development tendency and possible number of veterinary position numbers in China in 2017 was deduced depending on the data in 2010 and 2011.

MATERIALS AND METHODS

Veterinary position number needed in China in 2011: China needed 176,843 veterinary position numbers in 2011. Thereinto, veterinary service organization and animal husbandry respectively occurred 74,409 (42.08%) and 102,434 (57.92%). In animal husbandry, veterinary drug and device industry needed 3,088 (1.75%), feed industry needed 22,410 (12.67%) and animal farm needed 76,936 (43.5%).

Veterinary position number needed in veterinary service organizations: The <Regulation on animal diagnosis and treatment organization management in China>specified that animal clinic and hospital at least have one and three licensed veterinarians respectively. According to the statistics of the Ministry of Agriculture of the People’s Republic of China, there were 16,597 private clinics and 2,308 private hospitals in China mainland. Therefore, the minimum veterinary position was 23,521 (Table 1).

Otherwise, China had 31 provinces (straight administration cities or autonomous regions), 318 cities, 2861 counties and 44,080 towns. In past years, China had set up complete veterinary service system and every province, city, county and town had one public veterinary service station. Obeying the demand of the Ministry of Agriculture of the People’s Republic of China, every public veterinary service station in province, city, county and town should respectively have four, three, two and one veterinarians. With these data, veterinary positions in public veterinary service station were 47,697 (Table 1).

The total veterinary position numbers needed in veterinary service organizations were 74,409 (Table 1).

Veterinary position number needed in animal husbandry: Animal husbandry mainly included veterinary drug and device industry, animal feed industry and animal farm.

Veterinary positions needed in veterinary drug and device industry: <The regulation on veterinary drugs in China> defined that veterinary drug enterprise must have technician of veterinary medicine. Forever, Veterinary Bureau of Ministry of Agriculture of the People’s Republic

Table 1: Veterinary position number in veterinary service organization of China in 2011

Organization	Patterns	Quantity	Veterinary positions of every organization	Veterinary positions in different pattern of organization
Private clinic or hospital	Clinic	16,597	1	16,597
	Hospital	2,308	3	6,924
Public veterinary service station	Province station	33	4	132
	City station	318	3	954
	County station	2861	2	5722
	Town station	44,080	1	44,080
Total		66,197		74,409

Veterinary position number were the minimum demand

Table 2: Veterinary position number needed in veterinary drug and devices industry of China in 2011

Industry	Value of output every year (million)	Veterinary position of every enterprise	Amount of enterprise	Small amount of position
Scale of veterinary pharmaceutical enterprise	<10	1	896	896
	10~50	2	346	692
	50~100	3	76	228
	≤100	4	68	272
Veterinary device enterprise		1	1,000	1,000
Total			2,386	3,088

Veterinary position number were the minimum demand

Table 3: Veterinary position numbers needed in feed industry of China in 2011

Type	Scale of feed enterprise (ton)	Veterinary position of every enterprise	Amount of enterprise	Small amount of position
Commercial feed enterprise	<10,000	1	12,662	12,662
	≤10,000	2	2,692	5,384
Premixed feed enterprise		1	2,894	2,894
Feed additive enterprise		1	1,470	1,470
Total			15,354	22,410

Veterinary position number were the minimum demand

of China emphasized that veterinary drug enterprise should have licensed veterinarian. Depending on the value of output every year, the enterprise lower than 10 million China Yuan of output at least had one licensed veterinarian, 10 to 50 million should have two licensed veterinarians, 50 to 100 million should have three licensed veterinarians and higher than 100 million should have four licensed veterinarians. Otherwise, every enterprise of veterinary device should have one licensed veterinarian. The total veterinary position numbers were 3,088 (Table 2).

Veterinary positions needed in animal feed industry: Veterinarians in animal feed industry make a crucial contribution in the field of food safety. China government demand the animal feed industry at least invite one veterinarian for the services of veterinary technique. Otherwise, large commercial feed enterprises should have one veterinarian servicing for the prescription of drug additive. <Statistics of China feed industry in 2011> showed that China had 15,354 feed enterprises including 1,470 feed additive enterprises, 2,894 premixed feed enterprises and 10,662 commercial feed enterprises. In these commercial feed enterprises, the output lower than 10,000 tons had 12,662 enterprises and higher than 10,000 tons had 2,692 enterprises. With these data, we evaluated that animal feed industry at least need 22,410 veterinary position numbers (Table 3).

Veterinary positions needed in animal farm: <Regulation of qualification on the condition of animal epidemic prevention in China> and <Administration rule on the production of animal heredity materials in China> claimed that animal farm must have qualified veterinarian. Beside wild animals the main animals in China were poultry, pig, cow, beef and sheep.

China had 213 zoos and 574 veterinarians serviced for wild animals (Table 4). Of the total, 31 large zoos had 155 veterinarians and every one had 5 veterinarians, 182 small zoos had 364 veterinarians and every one had 2 veterinarians, 11 large wild animal zoos had 55 veterinarians and every one had 5 veterinarians (Zhang and Ding, 2011).

Table 4: Veterinary positions needed in animal farms of China in 2011

Type	Scale of enterprise	Amount	Veterinary position of every enterprise	Amount of enterprise	Amount of position	Amount of position in every industry
Zoo	Province zoo		5	31	155	574
	City zoo		2	182	364	
	Wild animal zoo		5	11	55	
Egg enterprise	Amount of hen in rearing	<10,000	0	0	39,645	
		10,000-49,999	1	34,186	34,186	
		50,000-99,999	2	1,887	3,774	
		100,000-499,999	3	531	1,593	
		≤500,000	4	23	92	
Chicken enterprise	Amount of chicken in rearing	<50,000	0	-	0	7,935
		50,000-99,999	0	19,274	0	
		100,000-499,999	1	5,606	5,606	
		500,000-999,999	2	701	1,402	
		≤1,000,000	3	309	927	
Pig enterprise	Amount of pig in rearing	<5,000	0	-	0	14,675
		5,000-9,999	1	6,315	6,315	
		10,000-49,999	2	3,937	7,874	
		≤50,000	3	162	486	
Cow enterprise	Amount of cow in rearing	<500	0	-	0	4,123
		500~999	1	2,083	2,083	
		≤1,000	2	1,020	2,040	
Cow enterprise	Amount of beef in rearing	<500	0	-	0	5,224
		500~999	1	3,344	3,344	
		≤1,000	2	940	1,880	
Sheep enterprise	Amount of sheep in rearing	<500	0	-	0	4,760
		500-999	0	21,993	0	
		≤1,000	1	4,760	4,760	
Total				107,295	76,936	76,936

-: Meant the amount of enterprise was unclear. Veterinary position number were the minimum demand

China had 36,627 egg farms including 34,186 farms with 10,000-49,999 hens, 1,887 farms with 50,000-99,999 hens, 531 farms with 100,000-499,999 hens and 23 farms with over 500,000 hens (The statistical data of Animal husbandry bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The minimum veterinary position numbers in above farms according to their rearing amount respectively were 1, 2, 3 and 4 and then, the total veterinarian position numbers should be 39,645 in egg farm (Table 4).

China had 25,890 chicken farms including 19,274 farms with 50,000-99,999 chickens, 5,605 farms with 100,000-499,999 chickens, 701 farms with 500,000-999,999 chickens and 309 farms with over 1,000,000 chickens (The statistical data of Animal husbandry bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The veterinarians in above farms according to their rearing amount respectively were 0, 1, 2 and 3 and then, the total veterinary positions should be 7,934 in chicken farm (Table 4).

China had 11,414 pig farms including 6,315 farms with 5,000-9,999 pigs, 3,937 farms with 10,000-49,999 pigs and 162 farms with over 50,000 pigs (The statistical data of Animal husbandry

bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The veterinarians in above farms according to their rearing amount respectively were 1, 2 and 3 and then, the total veterinarian positions should be 14,675 in pig farm (Table 4).

China had 3,103 cow farms including 2,083 farms with 500-999 cows and 1,020 farms with over 1,000 cows (The statistical data of Animal husbandry bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The veterinarians in above farms according to their rearing amount, respectively were 1 and 2 and then, the total veterinarian positions should be 4,123 in cow farm (Table 4).

China had 4,384 beef farms including 3,344 farms with 500-999 beefs and 940 farms with over 1,000 beefs (The statistical data of Animal husbandry bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The veterinarians in above farms according to their rearing amount respectively were 1 and 2 and then, the total veterinarian positions should be 5,224 in beef farm (Table 4).

China had 26,753 sheep farms including 21,993 farms with 500-999 sheep and 4,760 farms with over 1,000 sheep (The statistical data of Animal husbandry bureau of the Ministry of Agriculture of the People's Republic of China) (Table 4). The veterinarians in above farms according to their rearing amount respectively were 0 and 1 and then, the total veterinarian positions should be 4,760 in sheep farm (Table 4).

The veterinary position numbers were the minimum demand.

Veterinary position numbers in China deduced depending on the rate of veterinarians to population in other countries: Canada had 12,215 veterinarians and 35,002,447 peoples in 2012 and the rate of veterinarians to population was 0.0349% (CVMA, 2013; Government of Canada, 2013). British had 24,576 veterinarians and 63,668,394 peoples in 2011, the rate of veterinarians to population was 0.0386% (RCVS, 2013; UN, 2012). Australia had 6,358 veterinarians and 19.3 million peoples in 2001, the rate of veterinarians to population was 0.033% (Heath, 2002). Japan had 29,000 veterinarians, the rate of veterinarians to population was 0.025% (JVMA, 2008; UN, 2013). America had 97,111 veterinarians and 31.3 million people in 2012, the rate of veterinarians to population was 0.0386% (AVMA, 2011; UN, 2013). According to the rate of veterinarians to population in Canada, British, Australia, Japan and America, the possible veterinarian position numbers in China was respectively 467,000, 517,000, 441,900, 334,800 and 415,000. According to the result of the sixth national census in 2011, the population of China was 1,339,000,000 (SSBC, 2011) and so, the average of possible veterinary position numbers in China was 435,175 (0.032%) (Table 5).

Table 5: Veterinary position number in China deduced according to the data of other country

Country	Veterinarian/population (%)	No. of veterinarians	Veterinary position in China deduced according to the data of other country (1.339 billion peoples in China)
Canada	0.0349	12,215	467,311
British	0.0386	24,576	516,854
Australia	0.0330	6,358	441,870
Japan	0.0250	29,000	334,750
America	0.0310	97,111	415,090
Average	0.0320		435,175

Veterinary position number were the minimum demand

Table 6: Growth rate of veterinary position number in veterinary service organizations from 2011 to 2012 in Beijing

Organizations	Patterns	Positions	Positions	Growth rate of veterinary position (%)	Position of veterinary service organization	Position of veterinary service organization
		in Beijing in 2010	in Beijing in 2011		in 2011 in China	in 2017 in China
Veterinary positions of every organization	Clinic	74×1 = 74	69×1 = 69	11.7	74,409	144,526
	Hospital	247×3 = 741	285×3 = 855			
Total		815	924			

Veterinary position number were the minimum demand

The position numbers in government should be veterinarian in above countries but that was not necessary in China. Besides the 265,000 veterinary position numbers in governmental organization (Zhang, 2012), China needed 170,175 veterinary position numbers in veterinary service organization and animal husbandry which was very anastomotic with the data 176,843 described previously. Furthermore, the total numbers and rate of veterinary position were also very near between (441,843 and 435,175 and 0.0330 and 0.0320%).

Development tendency and possible number of veterinary position numbers in China

in 2017: The growth rate of veterinary position number was calculated according to the data of veterinary service organization and animal husbandry from 2010 to 2011. The annual incremental rate of veterinary position numbers in veterinary service organization was 11.70% and then the position numbers in 2017 was 144,526. On other hand, the annual incremental rate of veterinary position numbers in animal husbandry was 11.46% and then the position numbers in 2017 was 147,550. The average annual incremental rate was 11.58% and the veterinary position numbers will be up to 292,076 in 2017 in China.

Possible position number of veterinary service organization in China in 2017:

Beijing had 321 veterinary service organization including 74 clinics and 247 hospitals in 2010 (BMBA, 2011). Whereas, the above data was respectively changed to 354, 69 and 285. according to the demand of Veterinary Bureau of Ministry of Agriculture of the People's Republic of China described previously, the annual incremental rate of veterinary position number was 11.70% (Table 6). Therefore, the position numbers of veterinary service organization in China will be 144,526 in 2017 deduced depending on the data of Beijing.

Possible position number of animal husbandry in China in 2017:

The development of feed, drug and veterinary device industry mainly depends on animal farm in China. So, we deduced the possible veterinary positions of animal industry according to the growth rate of animal farm from 2010 to 2011 (Table 7). The annual incremental rate of veterinary position number in animal farms was 11.46% and the position numbers will increase up to 147,550 in 2017 (Table 7).

The veterinary position numbers were the minimum demand.

Table 7: Annual incremental rate of veterinary position in animal husbandry from 2010 to 2011 and the possible position number in animal husbandry in China in 2017

Type	Scale of enterprise	Amount	Veterinary position No. of every enterprise	Growth rate of enterprise No. From 2010 to 2012	Veterinary position No. in 2011	Veterinary position No. in 2017	Amount of position every industry
Egg enterprise	Amount of hen in rearing	<10,000	0	0	0	0	65,785
		10,000-49,999	1	7.75%	34,186	53,500	
		50,000-99,999	2	13.88%	3,774	8,232	
		100,000-499,999	3	13.95%	1,593	3,487	
		≤500,000	4	35.29%	92	564	
Chicken enterprise	Amount of chicken in rearing	<50,000	0	-	-	0	19,907
		50,000-99,999	0	13.22%	0	0	
		100,000-499,999	1	15.73%	5,606	13,469	
		500,000-999,999	2	40.48%	1,402	5,388	
		≤1,000,000	3	22.62%	927	1,050	
Pig enterprise	Amount of pig in rearing	<5,000	0	-	-	0	26,829
		5,000-9,999	1	6.76%	6,315	9,350	
		10,000-49,999	2	10.94%	7,874	14,680	
		≤50,000	3	33.88%	486	2,799	
Cow enterprise	Amount of cow in rearing	<500	0	-	-	0	4,411.4
		500-999	1	1.07%	2,083	2,220.4	
		≤1,000	2	13.59%	2,040	2,191.0	
Cow enterprise	Amount of beef in rearing	<500	0	-	-	0	7,396.5
		500-999	1	5.76%	3,344	4,679.5	
		≤1,000	2	6.33%	1,880	2,717.0	
Sheep enterprise	Amount of sheep in rearing	<500	0	-	-	0	23,221
		500-999	0	26.7%	0	0	
		≤1,000	1	30.23%	4,760	23,221	
Total				11.46%	76,936	147,550	147,550

∴ Meant the amount of enterprise was unclear

DISCUSSION

Veterinarians in China usually do all the technique work in animal farm, such as medication, animal feeding, immune vaccination and drug and vaccine management. Sometimes, they participate in the daily management. With this specific phenomenon originated from the old veterinary system, accurate veterinary position numbers were difficult to calculate. We attempted to add up the veterinarians from questionnaire but the data were obviously different with that we investigated in farms. Certainly, it's difficult to investigate every farm in China.

The veterinary position numbers were divided into two large parts. The first part was the position numbers in veterinary service organizations including governmental station and private clinic or hospital. The second part was the position numbers in animal husbandry actually including feed, drug and veterinary device industry and animal farm. The 265,000 positions in governmental administration was a definitive number which was announced by Veterinary Bureau of Ministry of Agriculture of the People's Republic of China and this number would not increased with the current policy of China government.

The position numbers in veterinary service organizations and animal husbandry in new veterinary system would rise quickly. The possible reasons were (1) The quick developmental economic circumstance, (2) The opened veterinary service policy, (3) The relegated governmental functional authority to private service organization. Considering the low passing rate of licensed

veterinarian examination in the past years, China would not only take the licensed veterinary system in full scale operation in 2014 and also in 2017, because the demand of licensed veterinary position numbers increased with the rate of 11.7% and the total number in veterinary service organizations and animal husbandry will be up to 292,076 in 2017.

A special Chinese traditional culture as before affects the employment orientation of the persons who passed the examination of licensed veterinary medicine. Generally, Chinese think that “study for becoming an officer”. Many of the students who passed the licensed examination, hoped to get a duty in governmental office or institute. Some veterinarians changed their job while got the qualification of licensed veterinarian. Depending on the statistics of Chinese Veterinary Medical Association, only 22% of the persons who got the qualification of licensed veterinarian from 2009 to 2011 were employed in veterinary service organizations and animal husbandry. Although the young generation gradually changed their idea, the shortage of veterinarian was still large at present.

Statistics showed that most of the persons who passed the licensed veterinary examination were employed in central cities and mainly serviced for the diagnosis and treatment of small animals. This phenomenon was same as in other countries. A special policy was executed that the person who had experienced the veterinary medical education in university and been verified as a higher professional title (equal to or higher than associate professor) needed not to take part in the examination and directly awarded qualification of licensed veterinarian. Government originally hoped to redeem the shortage of veterinarian after the system in practice with this policy but usually, a person within these conditions was employed in institute and university and some of them were officers.

Now-a-days, China has 178 universities or colleges engaged in the education of veterinary medicine and about 20,000 students would graduate every year. Most of the graduates might take part in the national examination of licensed veterinarian but only a few passed.

With the above analysis, we thought that the licensed veterinarian system might not be taken in fully scale practice in 2017 unless China (1) Prolonging the tome limit for the system in practice, (2) Firstly taking the system in practice in central city, (3) Firstly taking the system in practice in the field of diagnosis and treatment for small animals, (4) Temporally authorizing the associate veterinarian with the right of prescription, (5) Adequately enhancing the passing rate of examination at present, (6) Facilitating and consummated the legislation for licensed veterinarian, (7) Subsidizing to the veterinarian who worked in countryside and animal farm through increasing the governmental financial budget, (8) Opening the market of veterinary service to the world.

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