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Use of Banned Veterinary Drugs in Feed: Food Safety Challenges and Strategies in China: A Review

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Abstract:

The Chinese people have had their imaginations challenged by a series of food and drug safety scares. China's Food Safety and use of non approved veterinary drugs efforts to improve quality and apply regulations have been discussed. The review covers most of the problem described for the determination of veterinary drugs residues checks, in edible animal products. A summary of the most relevant information about the veterinary drugs issues and hazards has been included. Main attention in the review is on the regulations and efforts of food and feed safety in use today for us. The most important classes of veterinary drugs and growth-promoting agents are Anthelmintics, Antibiotics, Coccidiostats, Hormones, B-agonists and Tranquillizers. Emphasis is given to the potential, and limitations, and their performance characteristics and residue evaluation of certain veterinary drugs. Reviews and committees in many countries have highlighted the need for better control of licensing of antibiotics, and codes for use of antibiotics for veterinary. The continued use of antibiotic growth promoters has been questioned and there is a need to ensure that antibiotics important in animals. There have been growing concerns about the effects of food safety standards on agricultural trade throughout the world. Therefore objective of the current review

paper is to assess the impacts of food safety in China, the one of world's largest meat producer and exporter country.

Key words: banned, veterinary drugs, animal feed and food safety

1. Introduction

Veterinary drugs are widely administered in food-producing animals to prevent or treat various types of diseases or stress-induced animal death (Stolker & Brinkman 2005). Antibiotics are used largely for three purposes in animals: therapeutic use to treat sick animals; prophylactic use to prevent infection in animals; as growth promoters to improve feed utilization and production. In general, therapeutic treatment involves treatment of individual animals over a short period with doses of antibiotic exceeding the minimal inhibitory concentration of the known or suspected pathogen (Mary D. Barton 2001). Antibiotics have been used in animal feed for about 50 years ever since the discovery not only as an anti-microbial agent, but also as a growth-promoting agent and improvement in performance. Tetracyclines, penicillin, streptomycin and bacteria soon began to be common additives in feed for livestock and poultry Veterinary drug residues in foods and food products have been reported to be harmful for consumer health and must not be permitted in food intended for human consumption. These drugs include antibiotics, anthelmintics, beta-receptor agonists, and steroids. The commonly used veterinary drugs include antibiotics for treatment of bacterial infections, anthelmintics to expel parasites from the animal body, b-agonists, and steroid hormones as growth-promoting agents. Most veterinary drugs are not acutely toxic. However, the residues of variety of veterinary drugs have been reported to be harmful for animal and human health. Some compounds have been banned in most developed countries due to their potential

carcinogenicity, such as nitrofurans, diethylstilbestrol, and chloramphenicol. For antibiotics, the allergic reactions, and the antibiotic-resistant cases are also important reasons for specifying maximum residue limits in food. This review paper analyzed the effects of veterinary medicines In response to the growing use of food animal production systems internationally and the potential implications for human health and fair trading practices, Healthy animals make healthy food .The use of antibiotic in animal production must be clear according their use level, treatment and require objectives time. Benefits and risks of specific antibiotics in terms of food safety and nutrition, elimination of production antibiotic use in animal agriculture should decrease resistance and benefit both human and animal health.

2. China's Food Safety System

Since 2002, Chinese authorities have been working hard on food safety issues at all points in the supply chain (China State Council). They have stepped up regulation and enforcement for both domestic and exported food, but safety standards for exports are generally higher and more stringently enforced than those for domestic food (Calvin et al. 2006 and Dong and Jensen 2007). Domestic food safety responsibilities are split among provincial and city agricultural, commerce, technical supervision, and health bureaus (Ellis and Turner 2008). Export food safety is centralized in the ministry-level General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ) and its provincial branches—known as CIQs—which are directly under AQSIQ's authority. AQSIQ requires that exported food meet domestic Chinese standards as well as those of the importing company and country. The CIQ tests product samples at the point of export to ensure compliance with safety standards. Beginning September 2007, each exported shipment inspected by entry exit or quarantine

authorities was required to have a seal from AQSIQ. Domestic food safety efforts tend to lag behind those directed at exports. Chinese officials in response to both domestic and international safety incident have stepped up domestic inspection and testing of food, introduction and dissemination of standards, and regulation of food producers and have initiated other measures aimed at achieving a broad-based improvement in the general level of food safety. Some of the prominent measures include the following (Calvin et al 2006, Ellis and Turner 2008, Cadilhon and Hoejskov 2005). Restricting agricultural production to areas free of contamination by heavy metals, like lead, cadmium, mercury, and arsenic, and controlling use of dangerous chemicals in agricultural production. Inspecting and testing final products in domestic wholesale and retail markets for compliance with chemical residue standards. Constructing a vast network of government laboratories to test agricultural products, soil, air, and water in rural areas. Setting up hundreds of central and provincial government demonstration projects related to "safe" agriculture. Implementing domestic certification programs (some voluntary, some mandatory) for food manufacturers and farms. Linking "production bases" (company farms or groups of small farmers) with processors or packing houses to standardize agricultural products and to control use of chemicals and veterinary drugs. Setting up a product tracking and tracing system. Publishing a "blacklist" of banned food additives. Depending on the chemical and the animal species, 30–90% of antibiotic added to the feed are excreted as the parent compounds and its conjugates, oxidation or hydrolysis products (Alcock et al., 1999).These antibiotics and metabolites included in animal wastes may contaminate soils when e.g. manure is applied to agricultural fields according to the rules of good agricultural practice. They may be also transported to ditches, streams and rivers via runoff and drain flow, to groundwater via leaching and may also enter into the food chain. A survey conducted in China sampled 143

animal drugs for the presence of antibiotics, with concentrations ranging from 0.01 to 1420 mg kg1 with frequencies of detection as high as 49.5% (Zhao et al., 2010). Other monitoring studies have found antibiotics concentrations from 0.9 to 44 lg L1 in wastewater from 3.3 to 636 ng L1 in river water (Xu et al., 2007) and from 0.02 to 15 lg kg1 in dry soil. Some antibiotics were also detected in groundwater and Sulfonamides and tetracyclines persist in the environment for a long time. Thus, those compounds may exert a selective pressure on microorganisms and result in development of resistance. Currently, there is a controversy over the use of antimicrobial agents in animal production due to their potential to select for antimicrobial resistance and destroy environmental micro-ecosystem. To mitigate the environmental and health risk of antibiotics, the applications of antibiotics as animal growth promoters have been banned in EU countries and the US (FDA, 2003). Although the Chinese government has set maximum residue limits of some veterinary antibiotics in animal foodstuff, no regulations have been issued to control the discharge of antibiotics containing livestock wastewater. China is the one of biggest producer of pig and poultry in the world, in which most pig and poultry farms do not have facilities for treatment and disposal of manure and wastewater (Tong et al., 2009). The annual usage of antibiotics has been estimated between 100 000 and 200 000 tons globally (Kümmerer, 2003), with over 25 000 tons used in China (Xu et al., 2007). Therefore, the extensive use of antibiotics in China may imply environmental occurrence at higher concentrations than in the other parts of the world. So far, however, there are few reports on monitoring of antibiotic residues in wastewaters from animal farms or in the water around the animal farms in China (Tong et al., 2009) in comparison to EU countries and the US.

3. Use of non-approved veterinary drugs and residues in our food chain

China's food safety problems are not a recent phenomenon. However, as China's international trade has ballooned, its farming and food processing practices have had a substantially greater impact on international consumers. China's total food exports reached $53.3 billion in 2005, compared to $7.5 billion exported in 1980. As China's food exports have grown, so have cases of adulterated or substandard products. In 2002, the European Union banned all imports of animal origin from China after finding residues of veterinary medicines in Chinese imports.1 In 2003, Japan blocked imports of Chinese frozen spinach for 8 months after finding pesticide residue in two batches from Shandong province that were 180 times higher than Japanese standards.2 In 2005, the cancer-causing anti-fungal agent, malachite green, was widely found in farmed fish; resulting in the bans of Chinese eels and processed seafood products in several major markets including South Korea, Japan, and Singapore. Just a year later, China faced new international bans of turbot fish after inspectors in Shanghai found excessive levels of cancer-causing veterinary drugs. 3 These events helped shape new procedures in China and Hong Kong which provide potential insights for US regulators currently formulating their own regulatory responses. Import safety concerns were elevated among US consumers in 2007, due largely to widespread media coverage of the pet food recall, as well as media coverage of violative Chinese-made consumer products such as toys made with lead paint. Congress and the administration responded to the attention with hearings and increased testing of imports. Total US import values have doubled between 2000 and 2007, reaching a projected $2.2 trillion in 2007. US total agricultural imports in 2006 amounted to $65 billion.4 Consistent with China's overall export trends, seafood exports to the US have increased from

$550 million in 2001 to $1.9 billion in 2006, representing about 22 percent of US seafood imports.5 Along with this increase in volume has come increased scrutiny from US regulators. The chronic misuse of veterinary drugs led the U.S. Food and Drug Administration (FDA) to announce an "import alert" on five types of farm-raised fish from China, halting importation until importers can prove that the products do not contain banned or excessive-levels of veterinary drugs.6 b-Agonists were originally developed for the treatment of bronchial diseases. Later it was discovered that these compounds were also efficient partitioning agents capable of promoting reduction in body fat and enhancing growth in cattle, sheep and swine if used in high dosage Besides, these compounds are easily left behind in animal bodies, which are a potential danger to human health (Brambilla et al., 2000).Although the use of b-agonists from growth promotion in food-producing animals is banned, some feed manufactures and farmers still illegally use these compounds as feed additives for more profit. The illegal use of these compounds for swine has already led to some cases of intoxication in humans after consumption of contaminated pig meat globally food scares are all too common (Brambilla et al., 2000). In 2011 China discovered that Chinese pork products tainted with Clenbuterol had entered the food supply. Clenbuterol is used to induce weight gain in food animals. It can cause various health concerns for Humans. Consumption exceeding the MRL can lead to 'mild' effects such as hospitalization with reversible symptoms of increased heart rate, muscular tremors, headache, nausea, fever, and chills. It has to be noted however that people who are sensitive to this drug could be far more severely affected by Clenbuterol residues in food than the general population. In modern food markets consumers are putting an increasing focus on the quality of their food. In order to keep this quality to the highest standard it is vital that food safety testing is rigorous and provides a complete picture of the food supply chain including

safety and traceability. Regular food screening for chemical residues such as antibiotics, growth promoting steroids and other chemical contaminants should play a key role in protecting the consumer. This screening ensures that only the highest quality products reach the food chain, producing a complete safety profile for all food products. With many food producers trying to meet customer demands for low cost products, the quality of food testing can suffer which could result in foods unsafe for human consumption reaching the supermarket shelves. The threat of drug residues in food is causing increased concern globally; therefore the presence of anabolic steroids including beta agonists such as Clenbuterol and Ractopamine, as well as other veterinary drugs such as Phenylbutazone is under a strict monitoring program in meat and animal feed. Other food that comes under scrutiny in particular for the presence of antibiotics includes milk, honey and eggs. As a result of the concern of excessive use of these drugs and the possible adverse effects on human health, many countries have set Maximum Residue Limits (MRLs) or tolerances for these residues in food. The Maximum Residue Limit is the maximum concentration of a residue that can be present in a product from an animal or animal by product intended for the food supply. These MRLs mean that it is required by law in the enforcing countries that any product in the food chain cannot contain residue levels that are harmful to human health above these limits. Drugs like Clenbuterol, Ractopamine and Phenylbutazone can have serious implications for human health if consumed in quantities exceeding these recommended safe MRLs.

4. Drug and Chemical Residue Checks

Traditional meat inspection procedures have now had modern additional checks added in order to safeguard the public. These checks are to look for substances such as growth promoters,

hormones, antibiotics or chemicals used legally or illegally in the production of the meat; with the aim of significantly reducing the risk of the public consuming meat with harmful chemicals Clenbuterol is called a "beta-2-agonist" and when fed to livestock it assists growth and increases the proportion of lean meat produced. People may suffer nervousness, fast heart rate, muscle tremors and other symptoms after eating meat containing the illegal use of this chemical. Checking for residues is not a static matter. There are constant changes; evolving problems and new matters have to be addressed. No matter what the source of food is. In the last few years, there have been many different problems with residues in food. Melamine in milk, malachite green in fish, caponizing hormones in birds, growth hormone in feed lot cattle are examples. In theory the list of chemicals or drugs that animals could be tested is unending. This list could include any of the drugs produce by the pharmaceutical industry. However, one has to be practical about this. An example of a list of the most relevant, from the point of view of risk to the public. Residue monitoring involves the sampling of foodstuffs to determine trends in use of veterinary drugs and to identify areas for further and directed monitoring (WHO/FAO, 2009). Residue monitoring also provides information on whether veterinary drugs have been used according to the label or whether off-label use is prevalent in the country. Usually only one, or a few veterinary drugs are chosen and these are tested for in meat and meat products. No enforcement or follow-up actions are typically carried out in residue monitoring. The WHO/FAO, (2009) indicates further that monitoring and sampling relating to residues like directed sampling, special or pilot surveys and targeted sampling. These are either for determining trends of residues in foodstuffs or to investigate in detail the accumulated levels of residue in a combination of foods, after preparation. Sometimes there is little distinction between residue monitoring and compliance monitoring and the two can

be combined. Countries that have indicated programmes include mainly developed countries like the EC under Directive EC 90/23; Canada through the National Chemical Residue Monitoring Programme, or NCRMP; the USA through the National Residue Program of the Food Safety and Inspection Service and New Zealand under the Food Residues Surveillance Program, whereas it is less common in developing countries. The Department of Agriculture, Forestry and Fisheries (DAFF) has a National Residue Export Control Programme which tests for residues of chemicals (including veterinary drugs) in carcasses intended for export as well as a small, very limited, residue monitoring programme for animal products consumed in South Africa due to financial constraints of analyzing large samples. However, residue monitoring is conducted by private retail and manufacturing companies, particularly for substances like antibiotics in milk since antibiotics may hamper production of cheese and yoghurts that require start up cultures (Cogan, 1972).

5. Legislation and Regulation

According to the Regulations on Administration of Feed and Feed Additives, the Regulations on Administration of Veterinary Drugs and the Drug Administration Law, list of Medicines forbidden in the feed and drinking water of animals is hereby announced to strengthen the management of feeds, veterinary drugs and human drugs, to prevent the use of unpermitted or the overuse of veterinary drugs and feed additives in the production, sale and use of feeds as well as in the drinking water of animals, to stop the overuse of illicit drugs. It is hereby announced that:

1. All the nutritional feed additives and general feed additives in production, sale and use must be on the List of Permitted Feed Additives (Announcement by the Ministry of Agriculture No.105), or be included in the feed additives newly

approved and announced. Enterprises producing feed additives must apply for and acquire the manufacturing license and the approval number. Feed additives newly approved must apply for and acquire a new certificate. Enterprises must abide by Article 16, 17 and 18 of the Regulations on Administration of Feed and Feed Additives, not allowed to sell and use feed additives that have not been approved for production.

2. The production of feeds containing medical feed additives must strictly abide by the regulations in the Standard Usage of Medical Feed Additives (Announcement by the Ministry of Agriculture No.168, hereinafter referred to as Standard Usage). It is not allowed to add medical feed additives that are in the Appendix Ⅱ of Standard Usage. The production of feed containing medical feed additives in the Appendix Ⅰ of Standard Usage must implement the standard of Feed Tag. 3. Any use of medical feed additives in breeding must abide by the Standard Usage, not allowed to use unpermitted feed additives or overuse feed additives. The use of medical feed additives must abide by the regulations of drug holiday, incompatibility, etc. 4. The production and sale of human medical must abide by the Drug Administration Law and related laws. Human drugs not examined and approved must not be directly used in the production and breeding process. 5. For pharmaceutical enterprises and individuals who produce and sell medicines on the list of medicines forbidden to use in feed and drinking water of animals, those who violate Article 48 of the Drug Administration Law and sell to feed enterprises and breeding enterprises (or individuals), shall be punished according to Article 74 of the Drug Administration Law by the drug supervisory and management department. For pharmaceutical enterprises and individuals who produce and sell veterinary drugs on the List of Medicines Forbidden to Use in Feeds and Drinking Water of Animals, those who sell to feed enterprises shall be punished according to Article 42 of the Regulations on Administration of Veterinary Drugs. Manufacturing enterprises

or individuals that produce, sell and use the feed and feed additives on the List of Medicines Forbidden to Use in Feeds and Drinking Water of Animals, violating Article 17, 18 and 19, shall be punished according to Article 25, 28 and 29 of the Regulations on Administration of Feed and Feed Additives by feed management department. Other enterprise units or individuals who produce, sell and use items on the List of Medicines Forbidden to Use in Feed and Drinking Water of Animals and use the items in the production of feed and in the breeding process, shall be punished according to laws and regulations of the department who uncovers the illegal act, in accordance with the who-uncover-it-who-punish-it principle; those who constitute a crime must be transferred to the judicial authority in accordance with the law of criminal responsibility. 6. Supervisory and management departments of feed, veterinary drugs, food and medicines at all levels must cooperate closely and coordinate with each other, strengthening the crackdown of illegal acts of adding forbidden drugs to feed in production, sale and use as well as drinking water of animals. The safety standard and feed and testing methods as well as the standard of residual poisonous materials of animal products must be accelerated in the making and improving process, thus providing technological grounds for administration and enforcement of the law. 7. Supervisory and management departments of feed, veterinary drugs food and medicines at all levels must further promote media coverage and popular science education. The emphasis must be put on the punishment for the illegal use of forbidden drugs in feed and breeding process, making full use of different kinds of media to promote the knowledge of laws and regulations of feeds, veterinary drugs and human drugs. Major and serious criminal cases must be tracked. Knowledge of feed, breeding and safe use of veterinary drugs must be spread. The awareness of management of veterinary drug usage must be enhanced for all groups in society, creating a good external

environment for the reduction of drug residual hazard and the insurance of animal food safety.

List of Medicines Forbidden for Use in Feed and Drinking Water of Animals in China

Adrenergic agonists	**Sex Hormone**	**Protein anabolic hormone**	**Psychotropic drug**
Clenbuterol Hydrochloride	Diethylstibestro	Iodinated Casein	Chlorpromazine Hydrochloride
Salbutamol	Estradiol:	Nandrolone phenylpropionate	Promethazine Hydrochloride
Salbutamol Sulfate:	EstradiolValerate:		Diazepam
Dopamine Hydrochloride	EstradiolBenzoate		Phenobarbital
Cimaterol	Chlorotrianisene		Phenobarbital Sodium
Terbutaline Sulfate	Ethinylestradiol		Barbital
	Quinestrol		Amobarbital:
	Chlormadinone		Amobarbital Sodium
	Levonorgestrel:		Reserpine
	Norethisterone		Other psychotropic drugs
	Chorionic Gonadotrophin		

Source: Announcement of the Ministry of Agriculture No 1519

List of Veterinary Drugs and Their Compounds Banned for Use for Food Animals

Serial No	**Name Of Veterinary Drugs And Their Compounds**	**Banned Purpose**	**Banned Animal**
1	Stimulants: clenbuterol, sulbutarol, cimaterol and their salts ester and preparations	All purpose	All food animals
2	Sex hormones: diethylstilbesterol and its salts and preparations	All purpose	All food animals
3	Substances with the effect of estrogen: zeranol, trenbonole, mengestrol acetate and preparations	All purpose	All food animals
4	Chloramphenicol and its salts esters (inc chloramphenicol succinate) preparations	All purpose	All food animals

5	Daspone And Preparations	All purpose	All food animals
6	Nitrofurans: Furazolidone, Furaltadone, Nifurstyrenate Sodium And Preparations	All purpose	All food animals
7	Nitrocompounds: Nitrophenolate, Nitovin And Preparations	All purpose	All food animals
8	Hypnosis And Sedatives, Methaqualone And Preparations	All purpose	Aquatic food animals
9	Lindane (Gamma – BHC)	pesticide	Aquatic food animals
10	Camaheclor	pesticide	Aquatic food animals
11	Furadan(Carbofuran)	pesticide	Aquatic food animals
12	Acaron (Chlordimeform)	pesticide	Aquatic food animals
13	Amitraz	pesticide	Aquatic food animals
14	Antimonypotassiumtartrate	pesticide	Aquatic food animals
16	Malachite green	Antibiosis pesticide	Aquatic food animals
17	Pentachlorophenol sodium	mollusciciide	Aquatic food animals
18	All Mercuric Preparation Including: Mercurous Chloride (Calmole), Mercurous Nitrate.Mercurous Acetate, Pyridyl Mecurous Acetate	pesticide	animals
19	Sex Hormones: Methyltestosterone, Testosterone, Propionate,Nandrolone, Phenylpropionate, Estradiol Benzoate And Their Salts, Ester And Preparations	Growing promoters	All food animals
20	Hypnosis And Sedatives, Chlorpamazine Diazepam And Their Salts, Esters And Preparations	Growing promoters	All food animals
21	Nitromadizoles, Metronidazole, Dimetronidazole And Their Salts,Esters And Preparations.	Growing promoters	All food animals

Source: Announcement of the Ministry of Agriculture No 1519

With great efforts made in this regard, China has now established a veterinary law and regulation system which takes the Law of the People's Republic of China on Animal Disease Prevention as the core, State Council's regulations as basis, and a series of departmental regulations and provisions as supplements. The Law of the People's Republic of China on Animal Disease Prevention was promulgated on 3 Jul. 1997 and took effect on 1 Jan. 1998. Its amendment was passed on 30 Aug. 2007 by the 29th Session of the Standing Committee of the 10th National People's Congress and took effect on 1 Jan. 2008. As the basic law on prevention, control and eradication of animal diseases in China, it sets down explicit provisions on various aspects, including prevention of animal diseases, reporting, notification and release of animal disease information, control and eradication of animal diseases, disease inspection of animals and animal products, diagnosis and treatment of animals, supervision and administration on animal disease prevention. On the basis of this law, the State Council has established rules and plans for emergency response management, and measures for bio-safety management of pathogenic microbe laboratories, management of animal drugs, as well as for the implementation of the Law on the Entry and Exit Animal and Plant Quarantine; the Ministry of Agriculture has formulated supporting regulations in a number of aspects, such as disease reporting, management of animal drugs, emergency response management, veterinarian management, bio-safety management for veterinary laboratories, surveillance and early warning, as well as quarantine and disease inspection supervision; on 1 Jan. 2010, the Ministry promulgated the amended Administrative Measures for Animal Disease Inspection and Measures for Examination of Animal Disease Prevention Conditions which took effect on 1 Mar. 2010 and 1 May, 2010 respectively. Laboratory management MOA issued a number of documents including the Implementation Schedule for the Evaluation of Veterinary Laboratories,

the Rules on the Management of Experts Evaluating Veterinary Laboratories, and the Notice on Accelerating the Introduction of Veterinary Laboratory Evaluation at City and County Level, set up expert team for the evaluation of veterinary laboratories, organized training courses on expert evaluation of veterinary laboratories, and launched sweeping campaign on the evaluation of veterinary laboratories. In 2010, 11 provincial veterinary laboratories (Chongqing, Liaoning, Henan, Beijing, Fujian, Heilongjiang, Shanghai, Anhui, Hubei, Tianjin, and Shandong) passed MOA evaluation. Evaluation activities are also spreading at city and county level. MOA revised the Guidelines on Laboratory Bio-Safety Administrative Review and Approval Procedures, placing strict regulations over bio-safety approval on highly pathogenic animal pathogen laboratory. Efforts were also made to establish regular reporting system on testing activities, tighten regulations over testing activities of 7 laboratories including Harbin Veterinary Institute; dispatch inspection missions to conduct sample investigations over bio-safety status of veterinary laboratories in Shanghai, Zhejiang and other areas, enhance bio-safety supervision on veterinary laboratories during the Shanghai Expo and Guangzhou Asian Games, and deliver training course on animal pathogens on civil aviation transport and national training course on bio-safety and quality management for veterinary laboratories, with some 200 people – heads and staff of provincial veterinary laboratories – having received trainings regulations of the withdraw period and effectively control hazards of animal drug residue.

6. Efforts to Improve Chinese Food Safety and the need for antibiotic alternatives

Antibiotics have long been used for treating disease, preventing disease, and improving feed efficiency in conventional livestock and poultry production. Their use was implemented in the

1950s as a way to meet the increasing demand for food. Antibiotics given to pigs were estimated to save as much as 20% of feed per pound of weight gain (Cromwell, G.L. 2002) Whether the same performance enhancement continues in the present remains unclear (Holt, J.P. et al. 2011). Concurrent with antibiotic use, antibiotic-resistant bacteria were isolated from animals receiving antibiotics from the earliest days. Concerns quickly arose about the development of resistant pathogens associated with animal and human diseases, as well as increases in the antibiotic resistance gene pool in all bacteria, but the risk was outweighed by the benefits of reduced cost to the industry (Agriculture Board, National Research Council). In addition to improving feed efficiency, antibiotics in agricultural animals are used to improve animal welfare, and so there must be a balance between antibiotic use and preserving antibiotic efficacy for both human and animal health. Sixty years later, the debate continues in the USA and abroad. Concerns over the spread of antibiotic-resistance genes to human and animal pathogens continue to drive the debate.

7. Feed safety laws and regulations in China

The National People's Congress (NPC) is the highest legislative authority in China. It is empowered to enact formal laws and rules. The State Council, head of the nation's executive, is empowered to adopt administrative measures, enact administrative rules and regulations, issue decisions and orders in accordance with those issued by the NPC. Within the State Council, there is an administrative office, the Legislative Affairs Office (LAO), which assists the Premier with legal advice and works together with different ministries in enacting administrative laws. Before going into feed safety laws in China, it is absolutely necessary to introduce the Food Safety Law first due to the impact it has on feed laws. Following a spate of food scandals and five years of deliberation and review,

the NPC gave the green light to the intensively-debated Food Safety Law on February 28, 2009. The law went into effect on June 1, 2009. On April 24, 2009, the State Council published the first implementation regulation related to the new law. The main impacts on Chinese food industry are as follows:

• Centralized government administration of food safety. Under the Food Safety Law, a Food Safety Commission is established under the State Council to act as the highest authority to oversee food safety throughout China. The commission will coordinate and supervise the main authorities responsible for food safety, including MoA, AQSIQ, SAIC, Ministry of Health and State Food and Drug Administration.

• Unification of food standards. Under the Food Safety Law, thousands of rules and standards that currently govern the Chinese food industry will be consolidated into one unified, published, national food safety standard.

• Three certificates to replace the old Food Hygiene Certificate

• Strengthened control over food additives

• Inspection exemption policy abolished

• Imported foods under stricter control

• Mandatory internal inspection and record system

• Stricter control over food-related advertisements

• Food recall system improved

• Increased penalties for non-compliance It is under the principle of this new legislation, old regulations and bylaws related to the food industry that are constantly undergoing substantial changes. As far as the feed industry is concerned, the current Feed and Feed Additive Regulation was enacted by the LAO of the State Council in May 1999. Two other ministries, Ministry of Agriculture (MoA) and General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) are involved in adopting the implementation methods under the leadership of the State Council. This regulation is compromised of the most important law system within the Chinese feed industry. The six

management methods are supplementary documents to the execution by either MoA or AQSIQ of the aforementioned regulations.

1. Supervision and quarantine methods of the import and export of feed and feed additives (AQSIQ, relatively new, implementation date September 1, 2009)

2. Manage methods of safety production and hygiene of animal raw material feed (MoA)

3. Manage methods of feed production licenses of feed additives and additive premix (MoA)

4. Manage methods of approval numbers of feed additives and additive premix feed products (MoA)

5. Manage methods of the new feed and feed additives (MoA)

6. Manage methods of registration of imported feed and feed additives (MoA) On February 20, 2010, the LAO published a revised version of the Feed and Feed Additive Regulations for public comments. This draft reflected the Chinese government's efforts in tightening the reins on animal feed to boost food quality and safety and can be seen as a consolidation of older measures with new requirements resulting from the latest announced Food Safety Law. It includes four chapters and 48 articles. The contents in the draft are double the amount of pages compared to the previous version. The main modification includes the following three main areas:

1. New feed and new feed additives. It clarifies the evaluation procedures and the responsible agencies for the new approval of new feed and feed additives. A monitoring period is also set forth for new feeds and feed additives. The scientist composition in the National Feed Evaluation Council is also spelt out.

2. Import and export of feed and feed additives. The registration procedures for first time imported feeds and feed additives are further tightened up. The marketing, packaging and labeling of the imported products are more refined.

3. Production, marketing and usage of feed and feed additives. A tracking and tracing system along the feed supply chain is spelled out. Tough punishment for abusing the use of animal feed and feed additives is imposed. Producers should immediately cease production and sales of detective products, recall the products and report the situation to the relevant administrative authorities.

8. Conclusion

The Global environment also suffers from overuse of agricultural chemicals and pollutants. Food production today is a global enterprise, under girded by investors who see agriculture in terms of dividends and derivatives, not nutrition, health or access to food. Regulators authorities in the China have allowed risky foods. The variety of challenges in the system of veterinary drug and residue regulation is linked by the fragmentation of structures, functions and legislation. , The potential human health risks highlight the importance of complete food safety testing before a food product reaches the public. Modern screening techniques now available commercially the presence of multiple drugs to be tested rapidly, ensuring that any positive samples are eliminated from the food chain. it is important that residues of veterinary drugs, identified challenges are being considered as the recommendation. Reviews and committees in many countries have highlighted the need for better control of licensing of antibiotics, and issued codes for use of antibiotics. The continued use of antibiotic growth promoters has been questioned and there is a need to ensure that antibiotics important in animal production has led to improved feed efficiency and increased growth rate. To achieve this objective, the paper discusses identified challenges and approved antibiotic regulated and instruction must be followed to avoid unintended consequences.

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