According to Chairman Xi Jin Ping's opinion during the 14th Central Government's Conference on the acceleration of the management of China's livestock manure utilization, the Ministry of agriculture hereby diffuses an action plan.

1. 1. General Guideline
In order to promote the "5 parts 1 body" strategy with a "4 facets" measure, China will continue to solidify measures for innovative, balanced, green development in its agricultural scene towards better environmental measures. The main focus will be on major livestock provinces and demonstration livestock farms, biogas and other natural biological gases, as well as organic waste as a main resource for agricultural use. The Chinese government will harden punishing measures and increase awareness and responsibility of respective entities in order to fully promote an integrated approach of livestock waste utilization as a resource, we will be supporting smaller agricultural farms to achieve this.

1. 2. Basic principles
Enforce the deployment of the action plan throughout the whole province. Focusing on major livestock provinces, we wish to bring in stronger support making sure that local government in the province take their responsibilities, and nurture third party organizations and social service organizations(associations) to fully implement animal waste management.

**Breakthrough:** Focusing on demonstration livestock farms (pig, dairy, cattle), we wish to encourage and guide old farms to renovate and upgrade. We will strengthen controls on new farms, promote livestock & crop farming, integrated farming development. According to different regions and resources, we will consider the economic models of animal waste management to promote the use of organic waste equipment and technology, so as to return organic waste back to the land.

1. 3. The goal of the action plan
Until 2020, we will implement scientific, clear controlling measures, to develop the livestock & crop farming practices, in order to reach the goals of integrated animal waste management
of an average of 75% at a national level, 95% in scale farms, and 100% equipment management in large-scale farms.

2. Principal Missions

2.1 Create integrated usage of resources - together with the Ministry of Environment, the Ministry of Agriculture will incorporate regular checks and measures, requesting local provincial government who do not realize their goals to report back to Central. Each province is to examine the large-scale farms, with regular reports of the progress of implementation. This is to ensure that large-scale farms will implement their mission of fully integrated animal waste management before the end of 2019. As for scale farms, demonstration farms (approved by Chinese standards), core breeding farms, culture farming promotional sites etc, all of those farms which do not respect the requirements, will see their rights being removed.

2.2 Improve livestock region and environment - we wish to insist on using the land to determine the type of livestock, the species to determine the breed. Farms' capacities shall be according to the land capacity, if the capacity is to be reduced, then shall the number of livestock. If the capacity is to be increased, so shall the number of livestock be increased. We shall guide over-sized farms to reduce, improve the situation of pig breeding, reduce the quantity of pig farm in the southern zone, thus guiding them towards other areas for cultures and to areas with larger land capacity.

2.3 Accelerate the upgrade of the animal husbandry industry - we shall continue to implement actions to standardize this industry, strongly develop standards in scale farming, support scaled farms to develop ecological farming practices, modify facilities, upgrades, automation, modernisation of farming standards, pushing for changes in animal husbandry production. We shall promote the precision farming management, put into place scientific guidelines for breeding process management, promote smart-farming and precise animal feeding, improve feeding yields. We shall strictly control veterinary medications, feed additives production and usage, strengthen the control of automation in the breeding environment.

2.4 Improve the usage of animal waste resources - we shall enhance the green development of activities linked to demonstration provinces, with major points such as reduction of waste in farms, neutralization of waste water, good usage of resources etc. During the “13-five” period (the 13th five year period between 2016-2020), we will create 200 demo provinces so that every province will fully integrate waste management into their farming practices. We shall encourage and guide those scaled farms in acquiring the required waste management facilities, upgrade the existing facilities. We shall encourage farm clusters to construct a central waste management centre, in order to develop central waste treatment facilities. Each animal husbandry bureau of each province shall provide guidance and technical advice on waste resources management according to the region's different types of farms and landscape.
2.5 Upgrade of livestock & crop farming standards

We shall support 3rd party organizations and social services organizations to develop professional technical advantages in order to develop ecological-friendly farming, with a special goal on upgrading the quality of fruit teas. There shall be a focus on fruit tea production areas, core production areas, areas with well-known brands as an important point to support and guide farmers and new operators in using organic fertilizers. We shall increase the research and development of equipment using organic fertilizers and biogas fertilizers to bring about a whole generation of farms with a typical model of livestock & crop farming standards.

2.6 Improve the efficiency of the usage of biogas and natural biological gases. To fulfill the requirements of farming energy revolution, we shall preferably push towards farming facilities, professionalized biogas installations, which are using animal manure waste as energy resource so as to improve farm energy development and protection of the environment. We shall also support the professionalization of biogas production, manure waste energy source, to have more clean energy for heating purposes. We shall guide large scale farms into biogas energy production, increasing the ratio of use of such energy production. Biogas projects will be given consideration and support, especially for high output economies such as apples, mandarins, vegetables, tea as well as organic waste integrated farming of livestock & crop fruit projects (vegetables, tea). We shall support large-scale farms using animal waste energy renewal to collect usage data, devices and also the land necessary for such renewable energy, promoting the return of digestat to the soil.

3. The important differences of the regions and technical methods

According to china's current agricultural situation, we can see 3 ways of implementation.

1. By reduction at the source. By promoting more usage of animal feed additives such as micro-organism-based additives and enzyme-based additives and more usage of low nitrogen/low phosphate/low mineral type of animal feed formula, we can improve animal digestion efficiency. In addition, we shall decrease the usage of veterinary medication and copper & zinc type of feed additives so as to reduce animal waste production. We shall undertake measures to guide scaled farms in using different ways of recycling waste water such as: removal of dried waste instead of washing with water, using water-saving drinking system or water-distribution/dripping system, separate rain water from waste water, recycling waste water to wash animal waste and such diverse measures, in order to control the volume of waste water produced in a farm right at the source. Farms having manure storage pits underground should limit water wastage to a minimum.

2. The 2nd way is by controlling processes. Scaled farming should determine its size and thus farming methods by the land capacity, the farms should be equipped with animal waste treatment facilities, using bacteria based composants in decomposing fermentation, bacteria in water treatment and odour control, accelerate the process of waste neutralization, reduce the diffusion of nitrogen, phosphate and bad odours etc.

3. The 3rd way is through terminal use. Farms having cattles (for meat), goats and poultry are encouraged to use their solid manure for crop cultivation or construct a centralized manure treatment center to produce organic fertilizers products. Pig and dairy farms on the other hand, are encouraged to recycle the entire animal waste (solid & liquid) to be spread back onto the land using the "manure spreading +"
slurry liquid waste as fertilizers" type of technique, hence boosting rapidly the integrated use of manure spreading technique and slurry spreading technique so that animal waste can be treated on the spot in the farm. With these basic principles, each region and province should act accordingly to their specific landscape, livestock breeding methods, land capacity in order to promote such farming models.

THE BREAKDOWN OF THE ACTION PLAN IN EACH CHINA REGION

3.1. Beijing, Tianjing Shanghai area (津 京 沪 区) - this area is highly developed economically. Scaled farming standards are high, but crop cultivation land area is very small. Thus the pressure on land capacity is high. The emphasized technique here could be either 1. Transforming waste water to fertilizers. Waste water could undergo several layers of filtration and sedimentation or through biogas techniques, to become neutralized. Farms will have to equip themselves in the transport of the liquid waste to be used as fertilizers during the fertilization and irrigation period in order to achieve the so-called "integrated solid liquid waste usage". Another technique could be 2. Recycling the use of solid waste as bedding. For scaled farms which practice liquid-solid phase separation, the solid manure can be re-used as bedding after high temperature heating which accelerates fermentation and kills bacteria. 3. Thorough treatment of waste water. For those farms without crop cultivation land attached, they should separate the slurry to solid-liquid waste, undergo thorough anaerobic and aerobic waste treatment, enabling safe water discharge or for recycling use (after antibacterial treatment).

3.2. The North-East Region ( Dong Bei 东北地区)

This region includes Inner-Mongolia, Liaoning, Jilin and Heilongjiang, 4 provinces. This region has vast lands and cold winters, thus the environment's capacity and land-use capacity is rather high. The technique which will be emphasized here will be 1. "Complete collection and recycling of animal waste for land fertilization". Farm clusters or large-scale farms should call upon professional waste treatment companies, concentrate the collection of slurry in pits and perform anaerobic treatment in order to neutralize the animal waste. Farms should use spreading machines to fertilize the land after harvest of crops or before the planting of new seeds. This is to reduce the use of chemical fertilizers. 2. Transforming waste water to fertilizers. For farms with crop cultivation lands attached, waste water is neutralized through anaerobic ponds or biogas processes, and should be used as base fertilizers to be spread after the harvest of crops or before the planting of new seeds. 3. Professionalization of energy renewal of animal waste. We should call upon large scale farms or a third party professional animal waste treatment organism to perform collective waste treatment through large-scale biogas processes or natural biological gases to produce electricity or purification of natural gas, Biogas residue is to be produced as organic fertilizers, digestat is to be used on cropping land or to be condensed for further use.

3.3. The East Coastal Region (Jiangsu, Zhejiang, Fujian, Guang Dong and Hainan)

These areas are highly developed economically, with a high population density, a dense water supply network, very small crop cultivation land, therefore a high environmental load. The technique to be emphasized here is : 1. Professionalization of energy renewal of
animal waste. We should call upon large scale farms or a third party professional animal waste treatment organism to perform collective waste treatment through large-scale biogas processes or natural biological gases to produce electricity or purification of natural gas. Biogas residue is to be produced as organic fertilizers, digestat is to be used on cropping land.

2. Ectopic microbial fermentation beds. Through grilled flooring, animal waste is collected under the farm building structure in a pool or transferred outside to a slurry pit. Microbial organisms are to be added for further decomposition. Those family owned farms using the model of "company+farm-owners" should use external slurry pits, as for scaled farms, they should be using elevated farm structure with underground slurry pit.

3. Transforming waste water to fertilizers. For farms with crop cultivation lands attached, waste water is neutralized through anaerobic processes. Farms will have to equip themselves in the transport of the liquid waste to be used as fertilizers during the fertilization and irrigation period in order to achieve the so-called "integrated solid liquid waste usage".

4. Qualified Waste water discharge. For farms without attached crop land, the slurry is to be separated to solid & liquid waste, to undergo thorough anaerobic and aerobic waste treatment, enabling safe water discharge or for recycling use (after antibacterial treatment).

3.4. The Central East Region (Anhui, Jiangxi, Hubei & Hunan)

These regions are China’s important cereal producing and animal producing privileged regions, and are situated in the dense southern water network system. Thus the environmental load is high. The emphasized technique is: 1. Professionalization of energy renewal of animal waste. We should call upon large scale farms or a third party professional animal waste treatment organism to perform collective waste treatment through large-scale biogas processes or natural biological gases to produce electricity or purification of natural gas. Biogas residue is to be produced as organic fertilizers, digestat is to be used directly on cropping land or used in a condensed form.

2. Transforming waste water to fertilizers. For farms with attached crop land, waste water could undergo several layers (three layers) of filtration and sedimentation or through biogas techniques, to become neutralized. Farms will have to equip themselves in the transport of the liquid waste to be used as fertilizers during the fertilization and irrigation period in order to achieve the so-called "integrated solid liquid waste usage".

3. Qualified Waste water discharge. For farms without attached crop land, the slurry is to be separated to solid & liquid waste, to undergo thorough anaerobic and aerobic waste treatment, enabling safe water discharge or for recycling use (after antibacterial treatment).

3.5. The Northern Great Plains (华北平原区 Hebei, Shanxi, Shandong and Henan)

These regions are also China’s important cereal producing and animal producing privileged regions, so the emphasized technique will be: 1. "Complete collection and recycling of animal waste for land fertilization". In the plains where where crop land is vast, farms should call upon professional waste treatment companies, concentrate the collection of slurry in pits and perform anaerobic treatment in order to neutralize the animal waste. Farms should use spreading machines to fertilize the land after harvest of crops or before the planting of new seeds. This is to reduce the use of chemical fertilizers.

2. Professionalization of energy renewal of animal waste. We should call upon large
scale farms or a third party professional animal waste treatment organism to perform collective waste treatment through large-scale biogas processes or natural biological gases to produce electricity or purification of natural gas. Biogas residue is to be produced as organic fertilizers, digestat is to be used directly on cropping land or used in a condensed form. 3. Recycling the use of solid waste as bedding. For scaled dairy farms which practice liquid-solid phase separation, the solid manure can be re-used as bedding after high temperature heating which accelerates fermentation and kills bacteria. 4. Transforming waste water to fertilizers. For farms with crop cultivation lands attached, waste water is neutralized through anaerobic ponds or biogas processes, and should be used as base fertilizers to be spread after the harvest of crops or before the planting of new seeds.

3.6. The South West region (Guangxi, Chongqing, Szechuan, Guizhou, Yunnan, Tibet)

All except for Tibet, these 5 other provinces are China's main pig breeding area. However, the livestock farming practices are low-scale, with mainly family farms and small sized farms. The emphasized technique will be: 1. Ectopic microbial fermentation beds. Through grilled flooring, animal waste is collected under the farm building structure in a pool or transferred outside to a slurry pit. Microbial organisms are to be added for further decomposition. Those family owned farms using the model of "company+farm-owners" should use external slurry pits, as for scaled farms, they should be using elevated farm structure with underground slurry pit. 2. Transforming waste water to fertilizers. For farms with attached crop land, waste water could undergo several layers (three layers) of filtration and sedimentation or through biogas techniques, to become neutralized. Farms will have to equip themselves in the transport of the liquid waste to be used as fertilizers during the fertilization and irrigation period in order to achieve the so-called "integrated solid liquid waste usage".

3.7. The North West region (Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang)

These areas have shortage of water supply, main crops are grasslands, the crop cultivation land area is vast. The emphasize will be: 1. Recycling the use of solid waste as bedding. For scaled dairy farms which practice liquid-solid phase separation, the solid manure can be re-used as bedding after high temperature heating which accelerates fermentation and kills bacteria. 2. Transforming waste water to fertilizers. For farms with crop cultivation lands attached, waste water is neutralized through anaerobic ponds or biogas processes, and should be used as base fertilizers to be spread after the harvest of crops or before the planting of new seeds. 3. Professionalization of energy renewal of animal waste. We should call upon large scale farms or a third party professional animal waste treatment organism to perform collective waste treatment through large-scale biogas processes or natural biological gases to produce electricity or purification of natural gas. Biogas residue is to be produced as organic fertilizers, digestat is to be used directly on cropping land or used in a condensed form.