

An Analysis on the Maize Market of Jilin Province in China

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Absytract

Jilin province is one of the important area of grain production in china. The amount of marketable grain from Jilin in china accounts for 10% of all the marketable grain of the whole country. After 1980', the grain supply in Jilin has increased faster than before and come into being the crop structure that main parts is maize and the regional production of maize. Therefore, the increase of grain supply is the increase of maize yield in fact. The increase of maize demand is lagged comparing with the supply of one. Since 1980' Jilin is confronted with the puzzle of maize supply surplus. On condition that china has joined WTO, the supply surplus of maize in Jilin will appear the trend of extending. The approach of resolving the maize supply surplus of Jilin would be looked for on the field of production and circulation, the main task are improving maize quality and reduce maize cost .

Keywords : *Jilin province in China, the supply of maize, the demand of maize.*

1. Introduce

China is a country whose grain supply is relatively insufficient as a whole . Its per capita possession merely reaches the world's average level.(415kg. in the year of 2000).But in different regions, the grain possession is greatly different. Jilin Province, situated in northeast china, is one of the most important grain production areas and its total grain yield accounts for 5% of the total national yield while marketable grain accounts for 10% and per capita grain possession is 960kg. Maize is the most important grain crop in Jilin province and its yield accounts for 80%of the total grain yield in Jilin province. Furthermore, the great majority of grain allocated to other provinces is maize. Therefore, Jilin province is actually a big maize producing province. Although grain supply is still not enough as far as the whole country is concerned, Jilin Province, the g marketable grain producing area, has been facing the problem of being short of valid demand. After entering WTO, China will face fierce competition from the international market. Therefore, an urgent realistic problem to be quickly solved is to study the balance between supply and demand in maize market

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in Jilin province from the point of view of the international market.

I have been engaged in the grain production and the circulation of the grain main area in China for a long time and achieved some research results related with this paper.(See the references) On the base of the previous research, this paper not only analyzes the main factors of the corn growth in Jilin province where is the biggest merchandise corn producing area in China but also the structure and the changing trend of the corn need in order to look for a main path to solve the supply and demand contradiction of corn in Jilin province. Based on the study above, the paper puts forward the new ideas that optimize the resource deployment of the grain production in the collectivity of the crop distribution of China, and take the improvement of the corn quality as the main aim of Jilin grain production for the future.

2. Maize Supply in Jilin Province in China

Jilin has been a province that export grain to other ones since the foundation of P.R.C. But before 1980's, Jilin's grain amount of exporting was not high, about 1 billion kg. each year. After 80's, grain production increased rapidly. In 1983, grain yield attained the goal of 12 billion kg. for the first time in history, and in 1984 grain yield was even higher than that in 1983, reaching 16.1 billion kg. Since 1984, many grain supply indexes in Jilin province have occupied the first place in China, including the amounts of marketable grain allocation, per capita grain possession and maize export. As to Jilin province, it is maize rather than grain that is in the state of surplus. Considering cultivating structure, sown area of maize accounts for 60% of the total provincial sown grain area, and in the middle of 1980's, reached 75% (see table1). Grain production in Jilin is mainly the production centering around maize production, and the supply of grain in Jilin province is actually the supply of maize.

Maize production in Jilin province developed very rapidly after 1980's, which mainly benefited from the following factors:

Firstly, at the beginning of 1980's, "contracted responsibility system based on the household with remuneration or income linked to output" was ascertained in rural area of our country. This system significantly aroused the producing enthusiasm of farmers and greatly liberated the productive forces in rural area. Compared to other provinces in China, Jilin province fell behind in the implement of this system, which started in 1982. At the end of 1983, almost all the primary organizations of rural area had finished the ascertainment of this system. The reform of the microeconomic structure made the producing enthusiasm of farmers rise to an unprecedented height, and grain yield increased surpassingly. In 1983 grain yield reached 14.8 billion kg., increasing 4.8 billion kg. compared to 1982, with a growing rate of 48%. In 1984 grain yield reached 16.3 billion kg., increasing 1.5 billion kg. compared to 1983, with a growing rate of 10%.

Secondly, the development of agricultural science and technology provides inner growing factors for the increase of maize yield. After 1980's, the increasing of maize yields benefited improved variety and fertilizer to be used extensively. In 1978 the planting area of improved grain

crops occupied 66.4%, and maize 68%. By 1984 the planting area of improved grain crops reached 95.8%, and maize 98.9%. The spreading of the improved variety of grain led to the increase of per unit area yield by a big margin. In 1949 grain yield per hectare was 1095 kg., it reached 4665 kg. by 1984 and 5625 kg. by 1994, which increased 4530 kg. compared with 1949. The wide use of production materials of agriculture like fertilizer provides input condition for the enlargement of maize-growing areas. Maize is a crop in need of sufficient fertilizer, especially after some high-yield varieties being available in the market. After 1970's, fertilizer was widely used in agriculture which further promoted the extension of maize-growing area. In 1965, the total amount of fertilizer application in Jilin province was 76 thousand tons (in kind), that is, 18 kg. per hectare on the average, which was at a low level. In 1977 the figure reached 578 thousand tons, that is, 138.0 kg per hectare, 7.6 times larger than that of 1965. By 1986, the total amount of fertilizer application of the whole province reached 2450 thousand ton, that is, 615 kg per hectare, and compared to 1977 the level of fertilization improved 3.5 times in 1994 (see table 2). The effect of fertilizer on the increase of crop production reflects not only on the improvement of the level of fertilization, but also on the readjustment of fertilizer structure and the improvement of the method of fertilizer application. Since late 1970's and early 1980's, the reformation of applying fertilizers on the basis of the compositions of measured soils has been popularized all over Jilin province. Since the practice of this technique, the average increase of maize yield has reached about 10-15%.

Table 1: Changes of maize supply in Jilin province

Item Year	Sown area (million ha.)	Yield per ha. (kg.)	Total yield (million ton)
1981	155.1	3405.0	527.3
1982	160.5	3675.0	589.3
1983	171.5	5490.0	941.0
1984	185.5	5955.0	1103.8
1985	167.9	4725.0	793.1
1986	198.9	5115.0	1016.4
1987	212.2	5803.9	1231.6
1988	198.7	6150.0	1221.0
1989	198.3	5085.0	1007.5
1990	221.9	6900.0	1529.6
1991	228.0	6585.0	1501.4
1992	223.4	6596.0	1743.6
1993	209.3	6594.0	1344.6
1994	210.0	6853.0	1439.4
1995	234.4	6307.0	1478.5
1996	248.1	7066.0	1753.4
1997	245.5	5135.0	1260.3
1998	242.1	7949.0	1924.7
1999	237.5	7125.0	1692.6
2000	219.7	4520.0	993.2

Source: the Agriculture Ministry in the People's Republic of China, *China Agricultural Statistical Data* (1981-2001), China Agricultural Press.

Table 2: the quantity of crop fertilization per ha

item year	total (ten thousand ton)	Quantity per ha (kg.)	item year	total (ten thousand ton)	Quantity per ha (kg.)
1977	57.80	138.0	1989	201.22	511.5
1978	66.70	165.0	1990	233.06	591.0
1979	91.30	225.0	1991	248.14	630.0
1980	120.20	297.0	1992	245.01	622.5
1981	114.90	283.5	1993	236.94	601.5
1982	135.30	330.0	1994	245.11	619.5
1983	152.20	375.0	1995	266.57	675.5
1984	180.50	447.0	1996	283.9	717.0
1985	159.23	397.5	1997	282.68	709.5
1986	179.06	450.0	1998	289.31	723.0
1987	195.80	495.0	1999	293.60	722.4
1988	190.67	483.0	2000	281.30	619.3

Source: Jilin province statistics bureau, *Jilin' Statistics yearbook*, (1978-2001). China statistics press.

Thirdly, the policy of pursuing the crop yield by Chinese government has promoted the rapid increase of maize production. China is a country short of grain. Before 1990's, the initial task of our agricultural policies was to increase the yield of crops with the aim of solving the problem of eating. As a high-yield crop, maize undoubtedly became the first selected crop to develop (see table 3) . Since the later period of 1970's, maize production in Jilin province has begun to take on a sharply positive trend of development. Up to the later period of 1980's, the increase of maize production had developed even more quickly than ever. In 1988, the planting area of maize in Jilin accounted for 49.2% of the total planting area of grain crops, having an increase of 11.7% compared to that of 1978.

Table 3: Change of main grain crop yield per ha. in Jilin province

units: kg./ha

crop year	maize	rice	soybean	jower	millet
1949	1245	2295	990	1200	945
1959	1485	2940	1260	1605	1125
1969	1380	2460	960	1200	1215
1979	3345	3915	1035	2550	1560
1989	5085	4770	1275	3030	1335
1999	7125	8725	2284	4930	2772

Source: 1. Jilin province statistics bureau, *Jilin Statistic year book* (1990-2000), China statistic press.

2. the Agriculture Ministry in the People's Republic of China, *China rural Statistic dada* (1949-1985), Agricultural press, 1986.

Fourthly, higher economic benefit has promoted maize production. Judged by the major producing areas of grain crops in Jilin province, maize, soybean and rice are more appropriate to cultivate, among which rice has the highest economic benefit. But the cultivation of rice is severely constrained by water resources, which is certain to limit cultivated area of rice. Compared with soybean, maize has remarkably higher economic benefit(see table 4. Thus to say, the increase of maize production is peasants' best choice.

Table 4: the cost and profit of maize, rice, soybean in Jilin

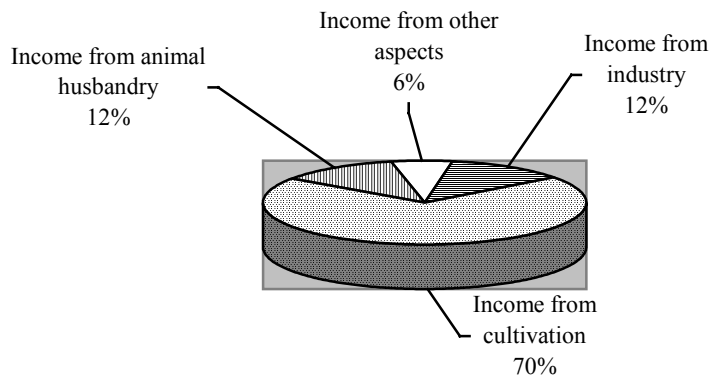
Unit: kg. Chinese yuan

item years	maize			rice			soybean		
	Per mu yield	Per mu cost	Per mu profit	Per mu yield	Per mu cost	Per mu profit	Per mu yield	Per mu cost	Per mu profit
1983	399	55.9	34.9	432	74.3	82.1	160	42.6	63.5
1984	419	61.2	44.9	426	90.6	103.58	129	43.4	35.4
1985	315	59.4	41.4	380	81.2	96.6	126	41.3	36.7
1986	341	56.8	95.3	333	81.7	132.3	114	40.0	58.1
1987	387	75.	69.5	404	101.2	138.2	133	54.8	41.9
1988	410	82.4	71.8	394	117.0	184.9	126	59.1	48.5
1989	339	98.3	83.4	318	152.4	225.3	85	64.1	45.1
1990	468	111.7	87.7	461	155.6	181.5	134	73.2	56.4
1991	409	114.8	63.4	471	174.5	180.1	111	72.8	38.2
1992	409	125.5	45.0	471	184.5	184.1	111	79.0	90.8
1993	440	136.3	82.0	450	194.5	620.4	133	97.8	126.3
1994	457	191.9	289.6	467	257.1	652.0	141	120.8	135.6
1995	420	262.9	231.2	486	301.8	457.2	138	153.1	181.2
1996	471	291.9	166.3	491	330.4	300.1	143	153.2	200.4
1997	271	272.5	-33.1	491	391.0	332.2	132	198.0	148.1
1998	545	276.9	151.6	506	363.6	227.1	175	181.4	120.3
1999	480	268.7	61.7	499	338.6	227.5	196	182.2	141.7
2000	349	253.7	16.6	468	298.9	217.7	156	185.8	50.8

source:the bureau of commodity price in Jilin province : investigate information of farm produce in jilin province (1984-2001)

Fifthly, grain production is the main income source of farmers in Jilin province. In order to increase income, they are sure to increase the production of maize. The non-agricultural industries in Jilin province are undeveloped. Farmers' income from cultivation accounts for 60-70% (mainly maize, see figure 1.) of the total. To increase their income, they will undoubtedly increase crop production and therefore increase the production of maize.

Figure 1: the net income structure of farmers in Jilin province in 2000



source: Jilin province statistics bureau, *Jilin Statistic year book*, China statistics press, 2001.

With the influence of these factors, the production of maize in Jilin province has been increasing rapidly since 1980's. And Jilin province has become the main region of marketable maize supply in China. Jilin province is among the first few provinces in many economic indexes concerning maize, including per capita maize possession, quantity of maize allocation and export, etc.

3. The Demand of Maize in Jilin Province

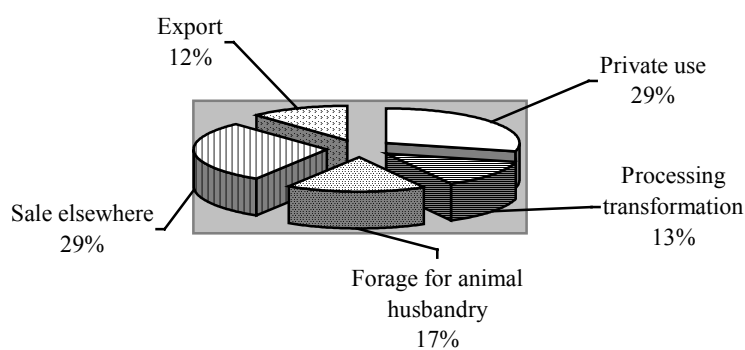
As a grain, maize can be used in many ways compared with other crops. Firstly, as a cereal crop, it can be used as grain rations. Secondly, it is forage crop. It's often called the king of forage crops. And it's also an economic crop. So compared with other cereal crops, it has wide processing value. According to an investigation, there are more than 300 kinds of processed maize products, the number of products is more than 4000. So in maize market, the demand of maize is the demand of multiple use. The demand of the three kinds of use of maize shows gradation, that is, with the increase of people's income, the demand of maize gradually changes from the demand of grain rations to the demand of forage crop and the demand of processing raw materials.

Before 1980's, the demand of maize in Jilin province was mainly the demand of grain rations, which resulted from the shortage of grain in China. Before the middle of 1980's, the fundamental goal of agricultural development in China was to meet people's basic need. The increase of maize production was mainly caused by the need of grain rations. The per capita grain possession was 392kg. Gradually, the demand of maize in China began to decrease. After the middle of 1980's, the demand of maize in China, including Jilin province as the major maize producing area, began to decrease sharply. Since 1983, with the rapid increase of maize yield, maize supply has taken on an obvious surplus. Under this circumstance, Jilin advanced the idea of on-the-spot maize transformation. The demand on maize transferred to the demand on forage and on processing

industry. Before 1990, Jilin was basically a province in need of livestock products. It needed to transport livestock products from other provinces. Each year, live pigs transported elsewhere was up to 300,000 heads. Since late 1980's, animal husbandry in Jilin has been developing very rapidly, and has realized its goal of being self-sufficient. With the progress of science, animal husbandry in Jilin manifested booming development and entered a new developing period, especially in the end of 1995 when our government of Jilin set up the strategy of building Jilin into a great province in animal husbandry. The model of regarding live pig development as the main body of Jilin economic development, together with the development of poultry raising like raising beef cattle, table chicken and geese, stimulated the increase of maize demand.

Compared with other crops, maize is of widespread industrial value. Traditional maize processing industry is wine-making industry, which has only a very small consumption of maize. New brand maize industry got very rapid development in the later period of 1980's, having starch as its main products. But the quantity of products at that time was limited and the formation was low-leveled. Maize starch processing enterprises were small in scale, most of which were county-run or township-run small enterprises, with primitive producing techniques, rather few products and low processing additional value. The deep processing of maize was further developed in the later period of 1990's, characteristic of the increasing varieties of denatured starch, comparatively large-scaled processing enterprises and the increasing amount of maize used for deep processing. But on the whole, the development of maize processing was still at a low level. Therefore, with only a little more than ten products, maize processing in Jilin was far from being the pillar industry of local economy.

Figure 2: the structure of demand on maize in Jilin province



source: Jilin province statistics bureau, *Jilin Statistic year book*(2001), China statistic press. and investigated by myself.

The demand on maize in Jilin province is limited, which means the major part of the total demand comes from other provinces and other countries. Since 1983, there have always been 10 billion kg. of maize sold elsewhere each year. Since the middle of 1980's, the export volume of

maize has also increased very quickly. Around 1990, maize exported amounted to 2 million tons. Compared with any other province in China, Jilin province possesses comparatively good grain producing conditions, especially after 1980's, the construction of marketable grain base invested by our country enhanced the further development of productive forces and therefore enabled Jilin to be an important grain producing area. Thus, from China's general market of demand and supply of grain, Jilin province is taking the responsibility of satisfying the demand of other provinces on maize.

In figure 2, the maize amount of consume by farmer account for 29%, in fact, maize as grain rations to consume by farmer merely account for 10% of all maize yields, others are sold or used as forage by farmer.

4. Principal Contradiction of Grain Supply and Demand in Jilin Province and Its Solution

China's per capita grain possession just reaches the world's average level, so China generally belongs to a country deficient in grain. Considering the quantity of present import, we can roughly define that the total consumption is within 5%. And in the coming 30 years, the population in China is still having a trend to increase. The capita area under cultivation will surely be accompanied by the increase in population and the progress in industrialization and urbanization as well. The retrograde motion between the two variables, population and cultivated area, will enlarge the bleach in our nation's grain supply and demand That is why we are still faced with the insufficiency of grain supply in a longer run. But it is only a general judgment, and the relation between supply and demand will appear differently when we mention different concrete areas. Let us take Jilin province as an example, since 1980's, we have been confronted with the problem of supply's exceeding demand. It is a kind of partial overproduction since the grain crops began to increase within a wide range in China. It is also the contradiction in comparison with the nation's whole situation. Under the partial overproduction comes a most serious trouble, that is, selling becomes difficult for farmers. Since 1983, farmers in Jilin province have been continuously confronted with selling difficulties, and the problem has not been settled till now. After China's entry into WTO, the problem will be even worse.

If we only consider the circulation aspect of grain, we can know that the reasons of selling difficulties in Jilin province vary at different stages. In the beginning of 1980's, Jilin carried out a "contracted responsibility system based on the household with remuneration or income linked to output", this system greatly promoted farmers' working enthusiasm. The construction of grain circulation establishment and the reform of grain circulation system was comparatively delayed and could not adapt to the huge increase of production. In the early 1980's, the average autumn grain needed to be put in storage amounts to 7 billion kg. while actual storage capacity was only 3 billion kg., which is far from being enough. Early in 90's, it was transportation capacity that made the selling run into obstacles. It was caused directly by the property of the setup of the north and the south in maize production and marketing. From the distribution of grain crops in China, maize

growing area is mainly in the north, and in the south, maize growing apparently lacks comparative advantages. This situation makes the south an important market. Jilin province lies in the northeast of China, the distance from Jilin to the south marketing area is more than 2000 kilometers, which causes the fulfillment of satisfying the supply and demand between the north and the south to be a very difficult problem. When it comes to late 1990's, the selling difficult resulted mainly from the fact that China's maize lost its competitive power in comparison with the imported maize with cheaper price but better quality from the international free market.

The main reason why supply exceeds demand in Jilin province is that from the perspective of maize production, maize quality is rather low. This is closely connected with the following factors.

Firstly, maize in Jilin has been planting in a boundary-overstepped way. Since 1990's, high-yield and long-reproduction strains have been introduced from Liaoning and Shandong province. Although the yield of strains introduced from low latitudes is raised, the mature degree is decreased and the content of moisture is high at harvest period. Quite a lot of maize, when being put in storage contains moisture as high as 23%. This not only brings pressure on the drying of maize but also greatly affects the quality of dried maize.

Secondly, maize quality in Jilin is uneven because maize strains are miscellaneous and maize production scale is small. Every farmer operates 1.3 hectare on average, the strains are different and the scope is minor. According to an investigation, 3 or 4 kinds of maize strains are planted at every limited hectare. The low degree of standard can not meet the user's demand and lower the quality of marketable maize.

Thirdly, on account of the low level of production organization, it is difficult to produce maize of the same standard. Since the end of 1970's, the system of contracted responsibility linking remuneration to output has been carried out. Although collective economy still existed nominally, it did not play a full role in the scattered state. The low degree of linking with market could not effectively supply the needed products.

China is a country with more people but less farmland. Now its per capita grain possession only amounts to the world's average. Whether at present or in the future, the surplus of grain in Jilin province is regional, temporary and structural. Before the middle of the 1990's, China still held the developing goal of increasing the total amount of grain. Whether the producers or the organizers of the circulating link have not been freed from the seeking of the numerical target. It can be said that the production of grain in China is at the changing stage of grain increase target.

With China's entry into WTO, the environment and rules of agricultural product trade have changed and the style of dealing with maize surplus will also change greatly. The age of maize export with allowance provided by Chinese government has gone. On the contrary, it must follow the rules of WTO. China will receive 7.2 million tons of maize import. Therefore the thought of dealing with the problem of maize surplus must comply with WTO's rules. Generally speaking, it is better to follow the following ways to solve the matter of keeping the balance of maize supply and demand in Jilin province.

Firstly, to optimize the collocating of grain production resources in whole agricultural area. Under the situation of the great impact of international market's cheap maize on China's market,

China should consider agricultural resources collocating with the view of general resources arrangement, and reduce maize plantation of stripped fields. China's maize belt is mainly along Northeast—Southwest China, and the main distribution is in North-eastern China. There are seldom the advantages of resources in the area beyond Changjiang. On the contrary, Jilin province has stronger advantages in national maize production compared with other provinces, and its per unit area yield doubles other low-yield provinces. China's main maize planting provinces are listed in table 3. Except in 2000, maize yield in Jilin is higher than that of other provinces(see table 5), the increase scope is more than twice the number. Therefore maize production in some non-abundant areas in China should be cut off to reduce the pressure of maize market. Simultaneously, maize production in major production areas should be supported by state government and local government.

Table 5: Maiz Sowing area and yield of Different Regions Unit: kilo-ha. ten-kilo- ton. kg.

Year	2000			1999			1998		
Region	Sown area	Total yield	Yield Per ha	Sown area	Total yield	Yield Per ha	Sown area	Total yie.	Yield Per ha
Average of China	23056	10600	4598	25903	12808	4945	25239	13925	5268
Jilin	2197	993	4520	2375	1692	7125	2487	1924	7949
Liaoning	1422	551	3874	1677	985	5873	1638	1120	6843
Hei Longjiang	1801	790	4390	2651	1228	4632	2487	1199	4823
Inner Mongolia	1298	629	4847	1571	771	4908	1470	839	5710
Hebei	2478	994	4012	2663	1088	4084	2581	1187	4600
Shanxi	793	354	4470	923	375	4076	886	476	5370
Shandong	2413	1467	6079	2768	1551	5604	2781	1553	5585
Anhui	485	219	4507	588	213	3625	570	226	3972
Guangxi	610	184	3016	594	171	2889	578	156	2700
Yunnan	1129	473	4190	1159	459	3963	1095	418	3816
Sichuan	1235	547	4431	1359	640	4709	1364	623	4565
Chongqing	500	197	3945	519	191	3678	526	190	3627
Gansu	464	210	4533	531	255	4804	511	258	5042
Shanxi	1056	413	3914	1123	440	3920	1065	481	4517

Source: The Agriculture Ministry of the People's Republic of China, *China Agricultural Statistic Data*(1997-1999), China Agricultural Press

Secondly, the main developing aim of agriculture production in Jilin province should be focused on the improvement of product quality. To Jilin, the present urgent task is to solve the problem of high-moisture in maize. To fulfill this task, it is necessary to popularize major maize

strains most suitable for this region. Also, the governmental purchasing system must be carried out strictly and low quality products should be refused. Simultaneously, the problem of the mixture of different-quality products resulting from small-scaled and scattered trade should be noticed. To enforce the creativity of agricultural organizations and realize the standardization of maize production, professional farmers' cooperative unit, agricultural enterprise trade and corporate trade based on the farmers' shares according to contracts should be established.

Thirdly, the development of maize processing industry in Jilin province should be accelerated. Before 1980's, maize was once the main food in urban and rural areas in Jilin. With the increase of people's living standard, maize now almost leaves citizens' food table and maize as people's food in China only occupies 15% of China's general maize production. At present its main use has transformed to forage and the raw materials of processing industry. The key to solving the problem of maize surplus lies in the transformation industry by developing animal husbandry and maize processing industry. Animal husbandry in Jilin develops rapidly now, but the general scale is not large and maize consumption ability is limited, especially food cattle enterprise is just on the by-product and simple processing stage. Though maize processing industry has developed more quickly than ten years, the processing level is still on lower stage, and thus on small and middle processing scales. The important reason of slow development of maize processing industry is that we lack proper policies to promote this. Up to now in Jilin Provincial investment structure of real estate, the investment in food process and production occupies only 6 % of investment in the whole industrial real estate, without the enforcing power of accelerating maize processing industry.

Fourthly, we should seek the ways to decrease maize cost. It is high cost of production and lack of market competition that arises maize surplus. The lower scale profits is the main factor of arising high production cost, so more methods of decreasing cost should be exploited in many aspects besides enlarging land planting scale. But industrialization and urbanization limit developing land as cultivated land. The other factor is the lower rate of fertilizer utilization, only 30 % at present in China, 50% lower than that of developed countries. The cost of fertilizer application occupies 40% in the matter cost of maize production. Therefore the increase of fertilizer utilization will obviously result in the decrease of the cost of maize production. Compared with developed countries, another factor that leads to the high cost of maize production in China is that the indirect investment in agriculture is not enough, thus, public products enjoyed by farmers are not enough. Therefore, after entry into WTO, China should transfer its attention from mere agriculture support to the increase of the supply of agricultural public products for farmers.

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