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PROMOTION OF NEW TYPES OF AGRICULTURAL IMPLEMENTS IN CHINA

[Summary: This report summarizes several chapters of the Hsin-shih Nung-chu ti T'ui-kuang, published by the Chung-yang Jen-min Cheng-fu, Peiping, 1952. Chapters 1 and 3 present the concepts that imperialism prevented development of tools for 2,000 years and that the objective of the new tools being introduced now is for collective farming. Otherwise, the chapter headings below indicate the content of this report. They are:

Chapter 1, A Short History of the Development of Chinese Agricultural Implements; Chapter 3, Importance of the Use of New Agricultural Tools; Chapter 5, Setting up Farm Implement Stations; Chapter 6, Work Done by the Farm Implement Stations; Chapter 7, Objects of New-Model Implement Promotion; and Chapter 10, Types of New-Model Farm Implements.

A Short History of the Development of Chinese Agricultural Implements

Chinese farmers accumulated thousands of years of experience in land cultivation and during that time invented many useful agricultural tools. At the beginning, these tools consisted merely of tree branches or poles. After society had evolved from the primitive communistic pattern to a slavish society there appeared in the Yellow River Basin a farm tool that was a sort of forked stick with curved handle which they called a plow (lei).

During the Chou Dynasty, after the use of iron had been discovered, there was fashioned a new type of plow called the "lei-ssu." This implement was very simple in construction, the upper part consisting of wooden handles while the lower part had an iron share. This plow was pulled by two men.

Later, as the population increased other tools were invented, such as hoes and spades. As agriculture flourished, plows were developed that could be pulled by animals. By the time of the Han Dynasty a plow had been invented that was much like the old-style plows still used.

For over 2,000 years, from the Han Dynasty until the liberation, the development of agricultural tools was at a standstill. This fact shows that during imperial domination no emphasis was placed on agricultural tools.

During the KMT rule, although other nations all had new tools, none were used in China except a few bought from abroad at a high price and exhibited in agricultural schools.

During the struggle against Japan many agricultural tools were destroyed. At the same time the American imperialists, wishing to suck up the rich blood of China, insisted on bringing in and promoting the use of their new type tools. This was a direct deterrent to China's progress in development of agricultural tools. All this has resulted in an unprecendented lack of tools in country villages and a general condition of extreme backwardness in the matter of implements.

Importance of New Agricultural Tools

New tools for production are indicators of a new power to produce. With new enthusiasm for increased production, farmers demand better technical aids toward such increase. The old-style tools are not effective, waste effort, and cultivate less acreage. Moreover, tools are of every sort, with each locality accustomed to use its own type of implement. This militates against uniting in a collective farm for increased production on a grand scale.

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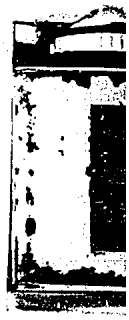

How can new tools meet the aims of increased production?

1. New tools increase unit production. The new plows go deeper. In testing deep plowing for corn the Soviets found that when the depth of plowing was increased from 10 centimeters to 20 centimeters, the amount of corn produced was more than doubled. In Shensi Province in a test comparing new and old plows, land where the new plows were used produced 17 percent more ginned cotton. Other tools are likewise superior. The new drills are better and the three-pronged cultivators have wider reach and cultivating is done much faster.

2. Increased production with new tools is possible also because of the very great saving in labor both for man and beast. This releases the farmer's time, making possible production in supplementary industries, and enlarging the scope of his productive activity.

3. By using new tools, full use can be made of all labor available in the country villages, male, female, and half-time labor. This increases agricultural production.

At present, the direction that increased agricultural production is to take is that of organized collective production. If our agriculture is to advance and come up to that of the Soviets and other new people's democracies, it must gradually change from separate individual production to collective production. Collective production is on a large scale and can attain its aims only by the very effective use of tractor-drawn machinery.

The present stage of agriculture in China is that of transition from individual, scattered use of old-type tools to the collective use of new mechanized equipment. The use of these new tools is closely linked with collective farming. After collectives are organized, mechanized equipment is essential. On the other hand, the desire for new machines is an incentive for the farmer to join collectives, for he has had a taste of the new machines but knows they are too expensive for the individual farmer to own. When collective farming has reached a certain stage the realization comes that for still greater increase in production fields must be joined and a single crop planted.

The use of new agricultural tools is closely related to the development of China toward industrialization. In the past, city industries have been out of touch with the needs of the country villages. Factory products have never been of any use in agricultural work in which farmers still used the hand-made tools of a backward era. How could agricultural production flourish under such conditions? Every year the city has taken large quantities of food and raw materials from the country with not the slighest help, in return, for the farmers. The country has always been isolated from the city with consequent hindrance to the nation's economic development. The best way is for industry to aid agriculture so that the fruits of industrial development may be passed on to aid agricultural production. After agriculture has advanced, then industry in turn will reach further progress.

With the nation's present rapid economic development and the increase in the number of industrial laborers country villages must furnish more food than ever before. As light industry increases the rural communities must also supply more raw materials. Furthermore, as industry flourishes and factories increase more laborers will be drawn to the cities with a corresponding loss of labor supply in the country. If agricultural production is still to be daily increased what other labor-saving is possible except the use of new agricultural tools?

Chairman Mao has told us "The contradictions between laboring classes and the farmers may be resolved by the method of the collectivization and the mechanization of agriculture." This mechanization starts with reform in the matter of tools and gradual elimination of the old implements. We must strive for rapid development of national economic construction so that the mechanization of agriculture may soon be realized.

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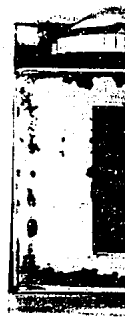

Setting up Farm Implement Stations

In the case of average commercial products there is no difficulty about promoting their sale if the article is good and the price reasonable. In the case of new agricultural tools, however, although they are more effective than the old, easier to use, require no great outlay of capital, and are more economical to use, farmers show an inherent conservatism desiring to keep the old-style tools handed down by their ancestors, the tools they are accustomed to use. They do not understand the advantages of the new implements, or if they do appreciate this they wonder how they can test them. It is necessary, therefore, to establish a definite locality and a special organization fitted for propaganda work and technical guidance.

In the last 3 years, the people's government has everywhere set up such stations for the promotion of new agricultural tools. This special organization has joined general cooperatives, agricultural supply and marketing cooperatives, or other similar organizations. It is essential to have special men with full responsibility for this promotional work and to choose suitable localities. The right personnel must be selected and the right equipment prepared for the new farm implement stations.

In choosing locations for such stations the following suggestions are offered.

1. Localities where farmers have already organized; for they are keen on production and have greater purchasing power.

2. Places with good transportation facilities either by land, with railroad, trucks, or carts, or by water, with steamers or ordinary boats.

3. Localities where there are agricultural economic products like cotton. Here there is good purchasing power and the new tools will increase production.

4. Places where labor is comparatively scarce, for there the people hope for more effective tools. Promotion of new implements is easy and at the same time great benefit comes to the farmers.

5. State farms. On the one hand, the new tools will help state farms work more effectively and on the other hand these farms become excellent demonstration centres.

6. Waste areas that may be opened to cultivation; for it is very difficult to do such work with old-type implements.

In arranging the staff of cadres for these Farm Implement Stations there should be a manager, and perhaps an assistant manager for the administrative and planning work but the main activities should be those of the technical promoters of the new tools, their number being dependent upon the amount of activities involved. These cadres, in addition to having a spirit of complete devotion to serving the people should have the following qualifications:

a. They should have a thorough knowledge of and full confidence in the new tools.

b. They should possess the ability to suffer hardship patiently with firm determination to do their work.

c. They should be thoroughly trained in the use of the new instruments, with a spirit of inquiry and experimentation.

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d. Feeling closely united to the masses they should be humbly receptive to ideas presented by the people, with a desire to learn from their experience.

e. They should manifest a love for tools and for property belonging to the people.

Work Done by the Farm Implement Stations

For the introduction and promotion of new farm implements, it is best first to establish only a few stations after gaining experience gradually to expand the promotion work. In such activities the following steps must be taken.

1. Survey and Investigation

The natural characteristics of the area and the social conditions must be noted. This would involve several inquires, as to:

a. The soil and topography (including nature of the soil, rich or poor quality, distribution of dry land and paddy fields, hills and plains, with percentages of each).

b. Economic conditions of the rural villages.

c. Degree of organization in the villages of mutual aid teams and degree of enthusiasm of model workers.

d. Kinds and distribution of crops.

e. Local habits of cultivation and calendar of planting.

f. Kinds of agricultural tools originally employed, their number, effectiveness, and methods of use.

g. Kinds and numbers of farm animals.

h. The situation regarding other agricultural promotion work in the locality.

2. Promotion and Instruction

After land reform the farmers were enthusiastic about production but still rather conservative in the matter of agricultural tools. When new agricultural implements come to a village there are three differing reactions. A few individuals are opposed to their use, a minority approve while the vast majority hold an attitude of skepticism. One must not underestimate the difficulties involved in changing their viewpoint. Anyone who thinks promotion of new tools will be easily done is due to have a rude awakening.

Promotion work should use all sorts of methods, such as bulletin boards, cartoon posters, exhibits, etc. Stress should be laid on explaining the value of the new tools in increasing agricultural production and in demonstrating their effectiveness.

3. Organizational Work

The promotion of the use of new agricultural implements is not like that of commercial products where one simply puts up an advertisement and waits for customers. It must be geared to the developing tendency in agriculture and must guide farmers along the path of organized effort. In the case of the large

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machines, it is true that they are costly as well as very efficient and so not suitable for purchase by the individual farmer but rather should be bought and used by a group.

In organizing the masses, it is important to take cognizance of organizations already existing. Individual farmers should be persuaded to organize by showing the advantages of such organization. Full use should be made of the leadership of model workers and the more active elements in influencing them to try the new agricultural tools. However, there should be no compulsion in the matter.

4. Instruction and Inspection

In using the new agricultural implements there are many complex technical matters to be considered. The installation, regulation, repair, and general care are all important. At present, the farmers greatly lack scientific knowledge, especially as it concerns machinery. This vitally affects the success or failure of the new tools. Workers must patiently instruct the masses. There are many ways in which this may be done, by explanatory addresses at conferences, with practical demonstration, with short term classes, or with individual instruction. The final aim is to see that the masses possess all these skills, managing the new tools as well as the old-style ones.

Since machinery is complex, after the implements have been turned over to the farmers the cadres promoting their use should from time to time make inspection of their effectiveness, helping solve any technical problems that may have arisen. As the farmers use the new tools they will gain valuable experience and will offer suggestions. The cadres should humbly receive such ideas, explaining why some are not useable but collecting and circulating those that prove valuable.

Objects of New-Model Implement Promotion

All new materials and new skills affecting agricultural production should first be recommended to the state farms, whence they can later influence the masses.

Another object should be the groups of organized farmers, who certainly should make use of new tools. It is an assured fact that the path of agricultural production is not toward individualized farming but toward collectivism. In accordance with this tendency new agricultural tools should first of all be promoted among mutual aid teams and local cooperatives who are comparatively progressive.

An important purpose of the promotion of new tools is to hasten the organizing of farmers as they advance along the path toward collectivism.

Types of New-Model Farm Implements

Agricultural tools increase in number and in complexity as society advances and the needs of the farmers increase. Classified by motive power there are tractors, horse-driven machines and hand tools. Classified according to the nature of work done there are implements for preparing land for cultivation, planting, cultivating, threshing, irrigating, and spraying.

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1. Implements to prepare Land for Cultivation

a. Plows

Classified according to construction there are three kinds, the moldboard plow, the disk plow, and the revolving plow. Classified according to the nature of the activity there are the walking plow and the sulky plow. Classified as to motive power employed there are those pulled by animals and those that are mechanized. Each kind, in turn, has several varieties.

(1) Moldboard Plows

(a) Walking plows with distinctive kinds, including the ordinary plow, one for hilly land, one for deep plowing in dry soil, one for reclamation work or use on grassy land, one for furrow plowing used also in ditch making, and one for light cultivation by shallow plowing, are used often for furrow planting and for the eradication of grass.

(b) A light adjustable plow; a large horse-driven model is suitable for use by organized farmers on large fields.

(c) The tractor plow; according to the size of the tractor or the amount of horse-power available several plows may be drawn at one time. This plow is fitted for use by collective or State farms.

(2) The disk plow is suitable for use in clay soil that is hard and dry, or full of weeds and brush.

(3) The revolving plow is very effective in pulverizing the soil but is very expensive and must be pulled by a powerful tractor.

b. Harrows

The important task of the harrow is to pulverize and level off the soil and to remove the grass just starting to grow. There are four kinds.

(1) The spike-tooth harrow is not suitable for clay or wet land.

(2) The spring-tooth harrow is suitable for soil comparatively hard and for land covered with small stones.

(3) The knife-tooth harrow is very effective in leveling off the soil, crushing clods, pulverizing the soil, and flattening out any surface layers of soil.

(4) The disk harrow is able to cut up comparatively large tree stumps. Tasks proven impossible for other harrows can be turned over to this machine. It is suitable for farms of large acreage.

c. Rolling Machinery

This machinery packs down loose soil lest it be carried away by the wind. After planting has taken place it helps units seed and soil. There are three main types of machines.

(1) Rollers. Some are constructed of stone and some of iron. Several can be pulled abreast, or in tandem fashion. They are not suitable for use on muddy land.

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(2) Rollers With Hollow Tubes. After land has been rolled with these machines the surface is not too smooth and even, moisture is conserved and so the surface is not too packed down after rain.

(3) Drags. Planks dragged along the ground can break up lumps of soil and level off the surface.

2. Implements for Sowing

Tools for sowing can complete three processes, simultaneously digging a furrow, sowing the seed, and covering the seed with earth. There are four main kinds.

a. Tools for Scattering Seed

Seed is scattered more evenly when mechanical devices are employed but their use is still not too general. There are machines with a sack for the seed, or with outlet behind the wheel. There are horse-driven carts with one or two wheels. Airplanes may also be used to sow seed.

b. Drills

The drill that makes the furrow, plants the seed, and packs down the earth is very efficient since the depth of planting is the same and the furrows are always even. Drills may be pulled by manpower, horses, or tractors.

c. Planting in Hills

Machines for planting in hills are suitable for comparatively coarse seeds like corn and beans.

d. Other Machines for Planting

Other machines can plant groundnuts, cotton, etc., but each machine can plant only a single variety.

3. Machines for Cultivating Crops

Such machines are used to loosen the soil and remove weeds around growing crops. They include:

a. Garden Cultivators

Parts of the machine can be interchanged to bank up the earth or to do harrowing work. These cultivators are usually propelled by manpower but may be tractor-drawn.

b. Horse-Drawn Cultivators

The varieties are many and include the following:

(1) Cultivators using spade-like teeth to soften the earth and cut off the weeds.

(2) Disk Cultivators are best for land covered with weeds or creeping vines.

(3) Spring-type cultivators with spade-like teeth have a spring at the head of the blade so that the blade is not injured when striking an obstacle.

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c. Tractor-Driven Cultivators

These cultivators differ only in the motive power that increases their efficiency. Some are separate machines drawn by tractors while others are cultivators with installed motive power.

4. Harvesting Machinery

These machines include all types that harvest the crops. Some are horse-drawn, others are tractor-drawn, and there are some in which harvester and tractor are combined into one machine. The harvesting of cotton and flax requires special types of harvesters.

a. Horse-drawn harvesters are divided into (1) horse-drawn mowing machines to harvest hay for fodder; and (2) horse-drawn reapers. In addition to the bar of cutting knives it has revolving arms to pull the grain over to be cut.

b. Tractor-driven harvesters differ only in motive power.

c. The harvester combine can perform five functions of cutting the grain, feeding it into the machines, threshing out the kernels, separating the grain from the chaff, and cleaning the grain. This is the best and most efficient machine. Some harvesters are drawn by tractors while others are self-propelled.

d. Other harvesters, such as for flax and cotton, can be used only for these particular crops.

5. Threshing Machinery

a. Grain threshers perform the four functions of conveying the grain, threshing out the kernels, separating the chaff, and cleaning the grain. Three kinds of power may be employed, animal power, electric power, or belt-transmission of power from a tractor.

b. Corn threshers are of two kinds; the spring type, using manual labor and the rotary motion type using transmission power. The latter is more effective.

c. Hay cutters are of two kinds; those with revolving knives and those with rollers bringing hay to the knives. Some machines are turned by hand while others rely on electric power.

d. Rice threshing machines usually use manpower in tread mills. The larger models using electricity can thresh rice six times as fast as the old-fashioned type.

e. Other machines slice potatoes and turnips, gin cottonseeds, fluff cotton, hull rice, and press oil from soybeans.

6. Machinery for Irrigation

There are three types according to motive power used (those using manpower are the old type).

a. Tools using animal power include water wheels of the cylindrical type (liberation-type water wheels) and of the dipper type. These prevail in North China. Small animals can be used and the machines are easily moved and easily installed.

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b. Power irrigation tools rely on electric transmission or have their own combustion engines. They include reciprocating engine pumps, centrifugal pumps, high pressure pumps and rotary pumps. All pump a great supply of water.

c. Irrigation tools relying on natural forces make use of the wind or of water pressure to irrigate. There are windmills, tube wheels, dipper wheels, movable well-bucket wheels and spiral revolving pipe wheels. In the Northwest this water power is widely used, while along the coast windmills prevail.

7. Spraying Machinery

There are hand tools and power-driven tools.

a. Hand sprayers include some that have a single tube and others that have two tubes (used with liquid disinfectants). There are also dusters that spray powder. These models are small and suitable for use on small plots of land.

b. Power sprayers usually have internal combustion engines and are for spraying liquid disinfectants. They are suitable for orchards and large fields of vegetation. Their efficiency is very high.

The most progressive method of all is that of using airplanes to spray liquid or powdered disinfectants to control plant diseases and prevent insect injury.

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