Production Performance Testing System (PPTS) is the basis of dairy cattle improvement. At the present time, a complete PPTS has not been set up yet in China. Milk production is recorded by the workers and farmers themselves including weighing, sample collection and testing milk composition. The poor data reliability resulted in low selection efficiency and slowed down the rate of improvement. It is absolutely necessary to establish PPTS urgently and to work out a long term implementation policy.

The following targets have been set for the year 2000 and thereafter for the dairy herds involved in the Dairy Herd Improvement Programme for Chinese Holstein (DHIPCH):
- Production performance data should be accurate and equitable as a result of PPTS implementation.
- The present animal population involved in the program, i.e: 35,000 Holstein should be increased to 5,000 in five years.
- The bulls used must be progeny tested and have positive breeding values; they must have a registration certificate issued by the China Dairy Cattle Association and use a permission certificate issued by the Ministry of Agriculture in China.
- Ten superior bulls should be selected and milk production of the 50,000 cows involved in the program should be increased by 250 kg per cow within 5 years (1996-2000).

**Equipment and Methods.** All equipment and methods used in PPTS must meet the standards defined by the National Dairy Herd Improvement Committee (NDHIC) and equipment accuracy must be tested according to their quality standards. Any equipment that does not comply with the standards is not allowed to be used in the recording system.

**Testing day and Testing Interval.** Testing is carried out once every month and includes three or two times milking according to the practice of the dairy farms. Testing interval should be not more than 33 days or not less than 26 days. The first testing day must take place six days after calving.
Milk Man (person in charge of testing). The testing day is selected by the person in charge of testing. This person should not inform the farm of his/her arrival more than twelve hours before the testing is carried out. This person should not be the working staff of the farm and should not have any economic relationship with the farm.

Milk weighing and sample collection. Milk weighing, sample collection and recording for every animal must be conducted according to the stipulated procedure and by people holding the required training certificate.

Cooperation of the Dairy Farm. The members (or the dairy farms) of the NDHIC must support and coordinate the work of the people in charge of testing. Everywhere management practices must be the same and should be a constant practice. The milk man must send a special report if any particular behaviour is observed happening on the farm.

Cows to be tested. All milking cows of the NDHIC member have to be tested.

Abnormal record. When a cow is sick or injured, or in heat and its milk production is going down to a certain degree compared with that obtained on that of the day before the testing day, a special note must be made on the record. The abnormal record will be adjusted at the data processing centre of NDHIC.

Abortion, premature delivery, calving before drying off and lactation before calving. Normal calving includes at least 250 days pregnancy and excludes those with a lower duration, which must be recorded as abnormal. If abortion takes place in the middle of the lactation, when the number of pregnancy days is less than 152, the current lactating record can be continued. If calving happens before drying off, the new lactating record begins from calving day and previous record ends one day before new calving. If a cow produces milk before calving, that production should not be included in the new record.

Lost testing day record. If a testing day record is lost accidentally (e.g. a record of weighing or sample is lost), the reason must be noted and lost data should be estimated by special methods at the data processing centre (DPC).

Testing milk composition (Fat, protein). All samples must be tested in a laboratory recognized by NDHIC or in the laboratory of the local DHIC.

Processing of the testing day record. All testing day records including milk composition must be submitted to the data processing centre within one week. And the information should be returned to the farmer after processing and analysis.

3.1 Type classification

- Adopt the linear classification.
- Linear classification score and global figure must be included in the progeny test result of the bulls.
- On mature cows involved in DHIP information on linear classification must be available.
• The implementation of linear classification must be carried out in accordance with the Practice Scheme of Linear Classification for Chinese Holstein (PSLCCH).

• Genetic Evaluation is carried out by DPC appointed by the China Dairy Cattle Association.
• BLUP is used for breeding value evaluation of dairy cattle
• All data used must be standardized.

Progeny tests must be conducted strictly according to both the progeny test regulation for Chinese Holstein Bull and to the and Progeny Test Management Regulation for Chinese Breeding Holstein Bulls. The proven bull, after having been progeny tested should comply with the condition stipulated in the Breeding Animal Management Regulation issued by the State Council of the People’s Republic of China. Frozen semen produced by these bulls can by used extensively only after receiving the Breeding Bull Certificate issued by the Provincial Animal Husbandry Department.

Breed registration should be carried out according to the Registration Method for Chinese Holstein issued by the Ministry of Agriculture. All animals which meet the standards of the breed are allowed to be registered.

Blood Typing (BT) is an important method to determine the parentage of an animal. The following animal, need to be blood typed
• The proven bull itself and its parents.
• Progeny born from embryo transfer both the and donor and the sire.

Figure 1. Progeny test regulation for Chinese Holstein bulls-Organisational structure.
3.7 Breeding system for Chinese Holstein

The main objectives of the breeding system are to complete breeding measures concerning selection and utilization of bulls with the aim of selecting top quality bulls by progeny testing. Breeding efficiency is influenced by the main following factors, i.e. size of the population, size of the active breeding herds (AB-herds involved in progeny testing), percentage of tested females in active breeding herds, annual number of tested bulls, number of daughters of each tested bull, number of positive proven bulls versus all participants in progeny testing, percentage of positive proven bulls among the sires.

The total Holstein cow population in China was 800,000 in 1995 but only 35,000 are in the ABH category. At the present time, only milk production and butter fat can be tested, protein will be included later on. The size of ABH will be enlarged in the future. The following table shows the calculation of the different population.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Size of active breeding herd involved (population)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35,000</td>
</tr>
<tr>
<td>% tested female</td>
<td>40</td>
</tr>
<tr>
<td>Number of proven bulls/year</td>
<td>35</td>
</tr>
<tr>
<td>Number of daughters of each proven bull</td>
<td>80</td>
</tr>
<tr>
<td>Number of young bulls/year</td>
<td>70</td>
</tr>
<tr>
<td>% of positive proven bulls</td>
<td>50</td>
</tr>
<tr>
<td>Number of young bulls used as sires</td>
<td>4</td>
</tr>
<tr>
<td>% positive proven bulls of the sire</td>
<td>11.4</td>
</tr>
<tr>
<td>Generation interval (year)</td>
<td>4.92</td>
</tr>
</tbody>
</table>

3.8 Structure of dairy herd improvement program for Chinese Holstein

Figure 2. Structure of dairy herd improvement program for Chinese Holstein
• **Age.** Not more than 18 months, weight at birth : 38 kg, semen quality: qualification of National Standard for Bovine Frozen Semen.

• **Pedigree bulls** must have a clear pedigree for 3 generations.

• **Sire.** Name & registration number and progeny test information: imported animal or semen should have complete ID including registration number and Name of the country of origin, ear tag number. Country abbreviation: America-USA, Canada-CAN, Japan-JPN, German-DEU, Netherlands-NLD, Denmark-DNK. Daughter number, herds, daughter first lactation average production, fat %

• **Dam.** Number and milk production and fat % of total and of 305 day lactation. Qualification: at least 7 000 kg milk production for the first lactation at least 9 000 kg milk for the highest lactation, fat % at least 3.6% or fat kg at least 324 kg.

The following particulars of the progeny should be noted i.e. born from Embryo Transfer (ET), Red Factor Carrier (RF), Inbreeding Coefficient (F). Left and right side photo should be available.

AI statistics for progeny tested bulls should include, the name of the farm, quality of semen, identification of the artificially inseminated female, date and number of pregnancies, fertility note (%), other information as may be appropriate.

Statistics on sons and daughters of progeny tested bull: in addition to the name of the farm, the following information should be available on the status of the progeny, number of males and females, average birth weight of males and females, abnormal hair colour, namely difficulty in calving, genetic diseases, other information.

Daughters production performance of the progeny tested bull: the information should include: identification of daughters, identification of sires, date of birth, birth weight, weight at six months, weight at twelve months, date of calving, production during the whole lactation: Kg of milk per day, fat %, protein % and Kg of milk over 305 days.

The registration of Chinese Holstein is actually the basis for ensuring the quality of the breed and of the breeding process. The record of information should be kept in an accurate and comprehensive manner. Initially, the pedigree provides basic information; subsequently as animals grow up, other information such as milk production, kilogrammes of fat, fat percentage of every lactation and type classification should be recorded.

• The parents of the animal must be registered.

• The Holstein blood proportion of the animal must be at least 87.5%.

• Imported animals must be registered.
The herds and breeders who meet the following conditions may receive an award from the Ministry of Agriculture and from the China Dairy Cattle Association (CDCA).

- The health condition of the herd must be good and should be evidenced by a veterinary certificate.
- The performance tests must comply with the regulations.
- The average production of the herd should be higher than the provincial or regional level and all females should be registered animals.
- Average conformation score must reach at least 75 points.
- The farm must be a member of the Local Dairy Cattle Association and of the CDCA.
- The breeders must have made an outstanding contribution to registration activities.

- Milk production: total milk production of all lactation must amount to more than 50,000 kg. Annual average milk production should be at least 8,500 kg, butter fat percentage should be at least 3.6% or the quantity of butter fat should be more than 300 kg.
- The conformation score should account for more than 85 points.

Production performance should comply within following requirements:
- at least 20 daughters must have completed the first lactation;
- production performance test must be recognized by CDCA;
- daughters’ average fat percentage should be at least 3.6% or average quantity of fat should be at least 310 kg;
- daughters’ average milk production should be at least 8,000 kg.

Note: adult equivalent correction factor: Lactation Correction Factor

| 1st | 13,514 |
| 2nd | 11,765 |
| 3rd | 10,870 |
| 4th | 10,417 |
| 5th | 10,000 |

Conformation classification. At least 20 daughters should have been granted the Type Classification score in accordance with linear classification tests.

Body Score should reach the following standards:

<table>
<thead>
<tr>
<th>Proportions in %</th>
<th>Body Score (Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;75%</td>
<td>76</td>
</tr>
<tr>
<td>50-75%</td>
<td>77</td>
</tr>
<tr>
<td>25-50%</td>
<td>78</td>
</tr>
<tr>
<td>&lt; 25%</td>
<td>79</td>
</tr>
</tbody>
</table>
If the animals meet the above standards they can receive awards from the Ministry of Agriculture of China.

Contents of registration record. Initial information. Farm number and name, place of birth: province (region or city) county and name of the farm, Colour pattern (left, right and head) or photo, sex, date of birth, year\month\date of application for registration, age at the time of application, blood typing, if twins (yes or no, if positive, indicate sex of the other twin), pedigree (3 generations, including blood typing of the parents and of maternal grand farther), if ET, if frozen or imported embryo, freezing date, transfer date, number of the recipients (farm or person) of the application: address, zip code, telephone.

Additional information on the animal to be added at a later date:
• Production performance of the cow including date of calving, lactation number, age at calving, actual number of days, days of milking, actual milk production and fat percentage, milk fat in production, kg and fat percentage in 305 days, conformation score (including date of classification), record for calves including sex, number and sire.
• Information on bulls must have progeny test results, first lactation performance of their daughters including year, number of daughters, actual average number of days of the milking periods, actual average milk production, average milk production in 305 days, average fat percentage, distribution of daughters (number of provinces and herds), average body score, ETAM, ETA%, ETAT and body score of the bull.

• Generally speaking, the price of registered animals should be 10 per cent higher than that of non-registered animals.
• Transactions of registered animal must go through the Local (Provincial, Regional or City) Dairy Cattle Association (LDCA) and a reasonable transaction fee should be paid.
• Registration fee

Registration fee should be paid to the Local Dairy Cattle Association including the cost of registration certificate according to the following scale: (RMB Yuan/head).

<table>
<thead>
<tr>
<th>Age at application</th>
<th>Member of LDCA &amp; CDCA</th>
<th>With registration for membership</th>
<th>Without registration for membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-6 months</td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>18 months</td>
<td>17</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>more 18 months</td>
<td>20</td>
<td>22</td>
<td>15</td>
</tr>
</tbody>
</table>

Note: 1 US$ = 8.3 RMB Yuan