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Quality Control in Seed Production

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Several quality control methods have been used in the seed industry for many years. Rarely, however, have these quality control procedures been as organized as those used in manufacturing. We are here attempting to suggest ways of integrating these often uncoordinated activities into an overall program, and to add new techniques which will be useful.

What is meant by quality control?

A well-organized quality control program can be a powerful management tool in a seed company. We are using the term "Quality Control" in a very broad sense--a system or method of approach to the solution of seed quality problems, together with the tools and skills required to reach the company's quality objectives.

Some of the basic objectives of quality control are the prevention of chronic troubles, discovery of causes of these troubles, and developing remedies for them.

The complexity of organization of a quality control system will vary directly with the complexity of organization and departmentalization of the company. In a small company, the manager may double as his own quality control expert. Large companies may have a separate department whose sole function is quality control. Organizqtion will depend also on the

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kinds of seeds produced, production area, and management philosophy. Details for each program must be tailored to fit the needs of individual companies.

Recent changes in agriculture which have brought about the need for a scientific approach to seed quality control include:

1. Specialized farming, increased size of farming units, and higher costs of crop production, which create a demand for high quality seed.

2. Mechanization in seed production, which is often an enemy of quality.

3. Development of new methods of measuring seed quality.

4. Increased costs of seed production resulting from increased use of hybrids and proprietary brands, and high land values.

5. Competition.

It is our purpose here to discuss certain segments of quality control dealing with testing and inspection methods. Also we hope to present some useful ideas and principles which each person may adapt to his own unique situation, and to demonstrate the use of tools which are basic to all quality control systems, large or small.

What is meant by seed quality?

Seed quality is constructed of many quality characteristics. In terms of individual seeds, these characteristics include viability, vigor, moisture content, maturity, mechanical damage, disease infection, size,

appearance, length of life, and performance. When extended to the seed lot, quality characteristics also include weed seed content and other foreign material, and uniformity of quality characteristics throughout the lot.

When defined as above, seed quality is at its highest when the seed reach maturity on the plant. From maturity onward, seed quality declines, at a varying rate. One of the jobs of quality control is to minimize the amount of deterioration that occurs before the seed is marketed and planted.

Genetic quality would be excluded from quality control in this context.

Seed quality is a competitive factor.

Seed quality has not been used as a competitive weapon as much as price and service, but opportunities exist:

1. Customer appeal from appearance standpoint.
2. A positive quality reputation by always delivering a uniformly good product.
3. A guarantee of quality.
4. Advertising quality in general, or some specific characteristic, such as cold test performance or seedling vigor.
5. Avoidance of disastrous quality failures which ruin a quality reputation.
6. Increasing customer quality-consciousness.

Costs of quality.

Many quality losses are avoidable with little or no expense: adjusting the combine, etc. Some quality losses can be avoided at small expense: modification of a machine or changing elevators. Other quality losses can be avoided only by spending more money than would be saved: picking corn by hand to avoid mechanical damage. Costs of sampling and testing are much less than the returns received.

Prevention of losses in seed quality.

Prevention of poor seed quality is the central theme of quality control. Losses in quality may be chronic or sporadic. Chronic losses are long standing small losses which are often accepted as unavoidable (mechanical damage). Sporadic losses are sudden changes from the normal and attract considerable attention from management and buyers (freezing damage, heating in storage.) The accumulation of chronic losses during the year may result in a larger loss of money than a few sporadic losses, but chronic losses are less noticeable. (For an analogy, compare the public reaction to 500 people killed in separate widely scattered automobile accidents versus 50 people killed in one airplane wreck.) The nature of sporadic and chronic losses will be made clearer in the following comparison:

Aspect	Sporadic losses	Chronic losses
Extent of irritation caused	Minor	Major
Tangible economic loss	Major	Minor
Solution required	Return to normal procedures	Change procedures
Type of data needed	Simple data for one cr two variables such as time, temperature, RPM's	Complex data for several variables
Frequency of testing	Frequent, hours	Infrequent, months
Type of test	Usually simple	Possibly complicated

Installing a quality control program.

Once a management decision has been made to establish a quality control system in a company, development of the program should be allowed to develop gradually, since considerable cooperation from all employees is required. One or two troublesome problems may be tackled first. After successful results are achieved, the quality control program may be allowed to grow step by step.

What results may be expected from quality control?

In general, a company may expect to obtain:

1. Improvement in seed quality.
2. Reduction in operating costs.
3. Repeat customers.

Techniques of quality control.

The quality control laboratcry is the hub of a seed quality control program. It is here that the quality control tests are made on which management decisions are based. (Figure 1).

One of the most important factcrs to consider in quality control is a systematic sampling procedure. Samples may be obtained for each crop, each lot, each grower, etc., and analyzed for the appropriate quality characteristics to be studies (mechanical damage, cold test reaction, moisture content, percent seeds adequately treated, etc.)

Data are taken on a number of samples to determine control limits within which to operate. These control limits should be economical for the job--neither too wide nor too narrow. Market demands and seed law requirements will help set the limits. From this preliminary testing, quality standards are established for each crop.

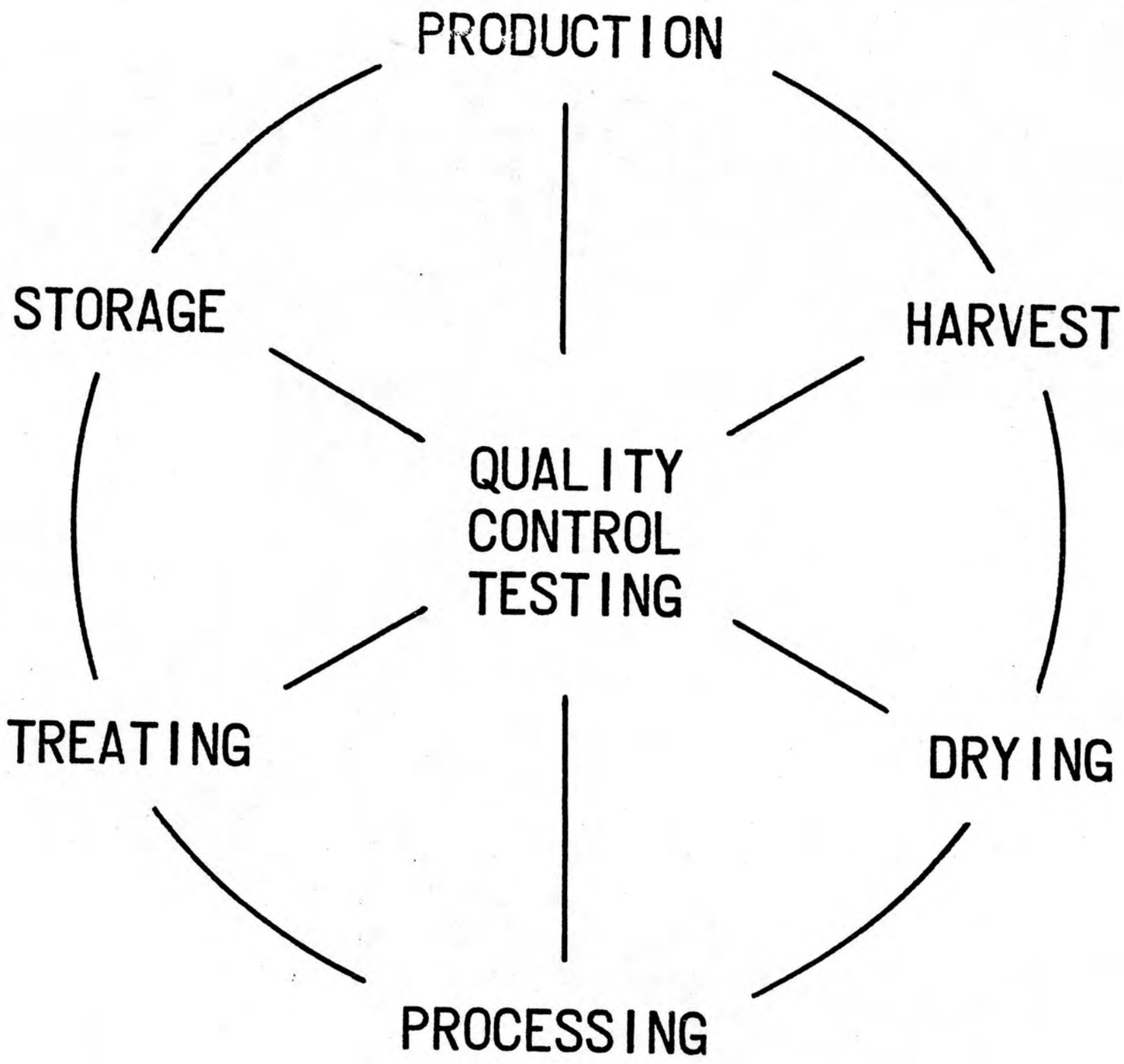
For each new lot being processed, results of samples taken periodically are recorded on quality control charts and checked against the established standards. If the characteristics of the sample exceed the control limits, corrective action can be taken to prevent the loss in quality from recurring.

Control charts and their use.

A control chart is a graphical comparison of actual seed quality with limits which reflect the expected quality as shown by past experience. Two illustrations of the use of control charts follow.

Figure 2 is a graphical check on corn storage conditions. Here it is assumed that the seed has been processed and bagged by October. The solid line represents normal cold test results as determined by past experience. The dotted line for Lot B indicates that cold test results for this lot are considerably lower than the standard. This indicates that the storage conditions for this lot were below standard or that the storability of Lot B is poorer than normal. Lot B should be held back for planting only under favorable field conditions and should not be carried over another year. The dotted line for Lot A indicates that this lot is storing better than normal and could be safely carried over in storage for another year. Corrective action can be taken to prevent the rapid deterioration of future lots as occurred in Lot B.

Figure 3 is a graphical check on processing conditions for corn. This type of graph can be used to pinpoint the places in the production process where quality is lowered. In this case, the solid line represents the amount of mechanical damage normally expected and which the company will accept. In Lot A, more damage occurred during harvesting and cleaning than normally expected. Corrective action can be taken to improve these two processes. Without such a control chart, the company knows only that Lot A has excessive mechanical damage, but cannot tell where or how it occurred so cannot prevent the damage from recurring.



THE QUALITY CONTROL LABORATORY IS THE HUB
OF A SEED QUALITY CONTROL PROGRAM

FIGURE 1

CONTROL CHART FOR STORAGE

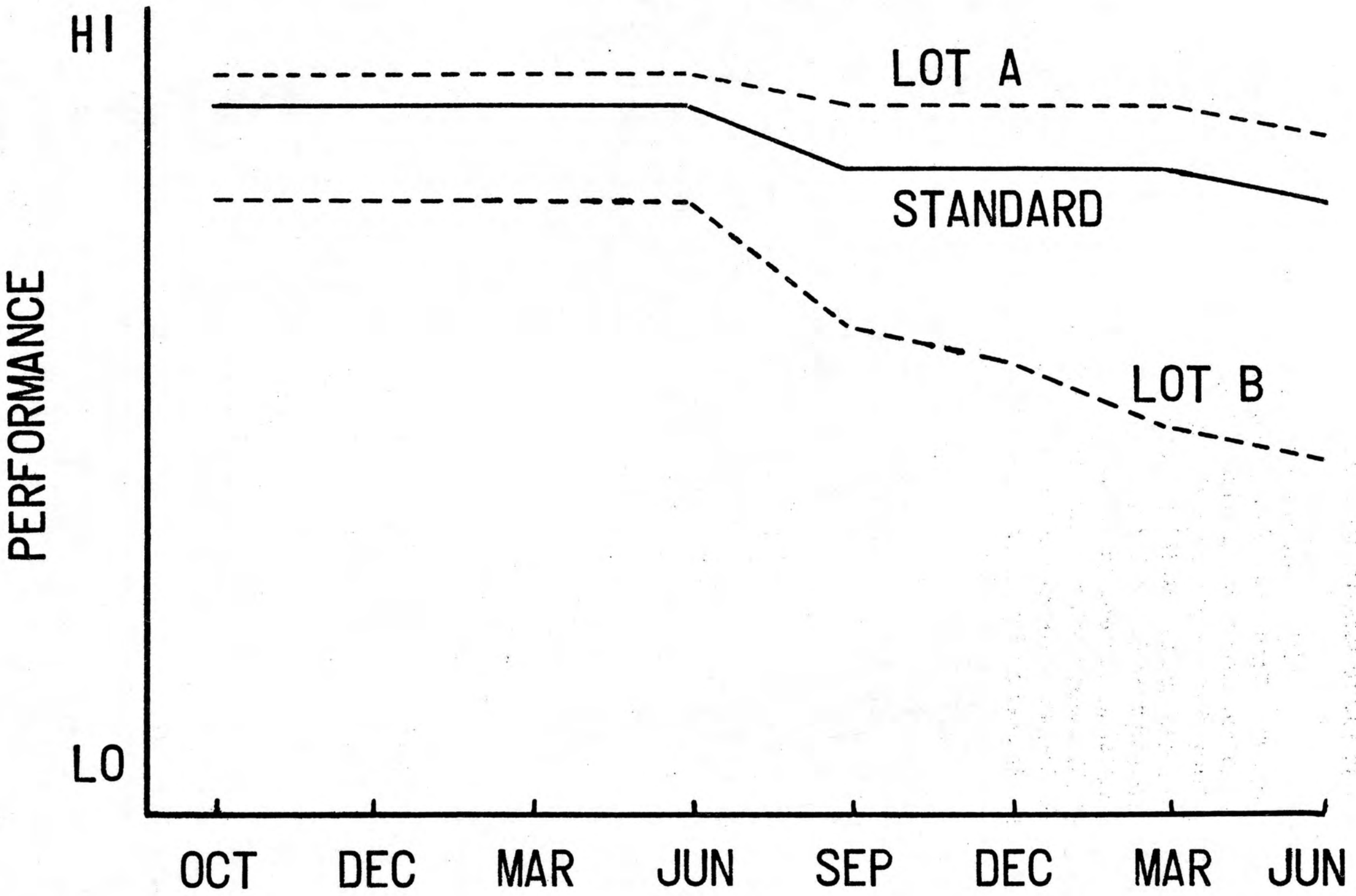


FIGURE 2

CONTROL CHART FOR MECHANICAL DAMAGE

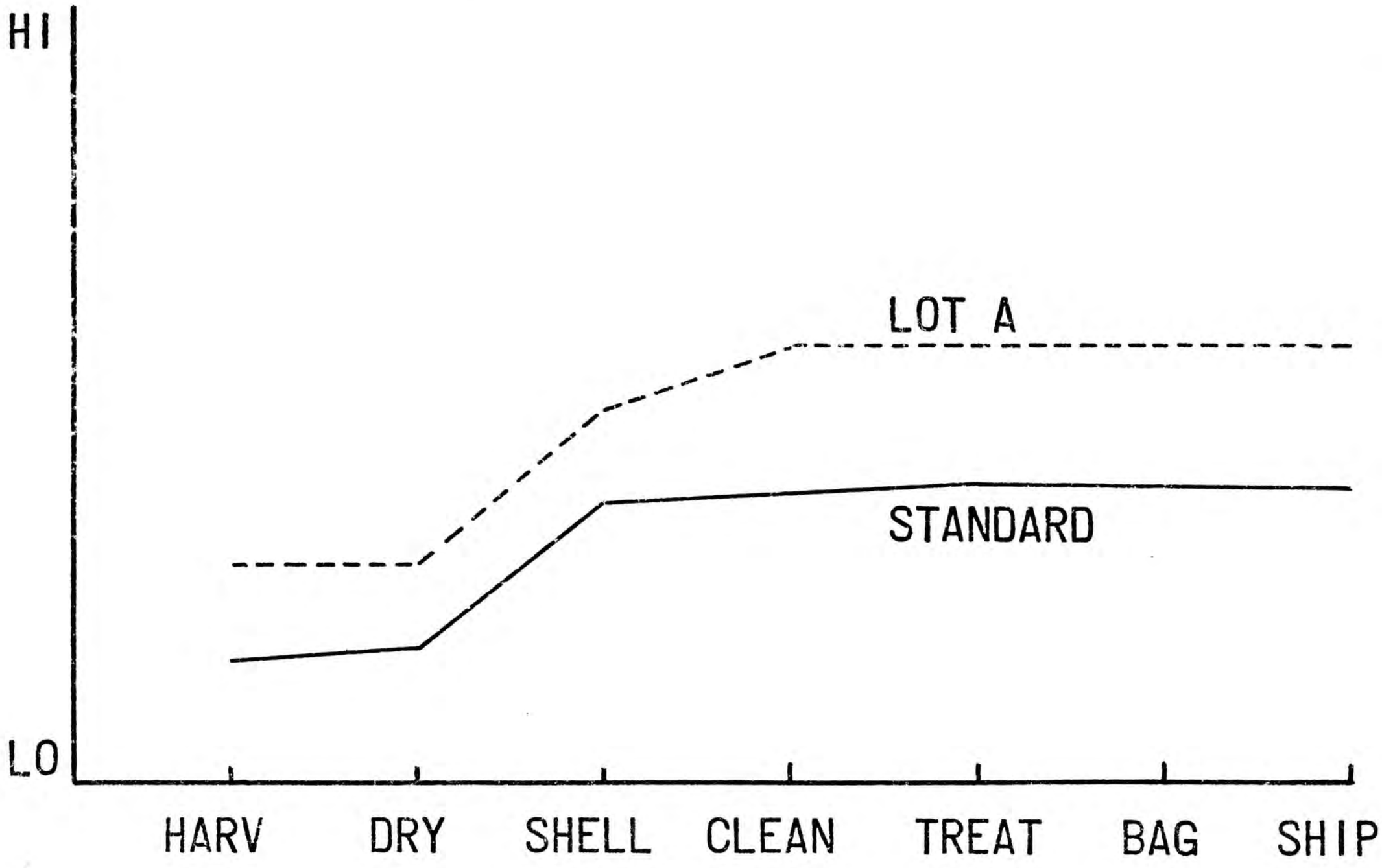


FIGURE 3