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DESIGN FOR PROFITABLE MANAGEMENT OF
SEED PROCESSING PLANTS

B. R. Gregg^{1/}

Proper layout and management of seed processing plants is the most important single factor controlling the profit - or loss - level of the plant. Managers must recognize the layout and management problems they face, and deal with them in the most efficient way possible.

An informal survey of processing plant managers indicates that 4 major "technical management" factors create the most serious problems. They are:

- (1) COMPLETE CLEANING - Complete, efficient separation of all undesirable material from the crop seed and at a high capacity.
- (2) MIXTURE PREVENTION - Avoiding contamination of the crop seed during processing and handling operations.
- (3) COMPLETE IDENTITY - Maintaining positive and separate identity of each lot and bag during handling, cleaning, bagging and storage.
- (4) EVALUATION AND IMPROVEMENT - A means of constantly evaluating the processing operations to pinpoint bottlenecks and inefficient operations, so that operating efficiency and seed quality can be constantly improved.

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Complete Cleaning

Machines needed

Weed seed or other undesirable materials can be separated from crop seed by differences in their size, length, shape, weight, surface texture, color, affinity for liquids, or electrical conductivity. A different separating machine usually must be used to remove contaminants differing from the crop seed in each of these physical properties. To obtain complete cleaning of seed, the processor must have in his cleaning line one or more of the machines which can make the required separations. Processors with too much equipment are badly outnumbered by the processors who don't have the equipment they need.

Machines required can be determined by a careful study of the contaminants which must be removed and their physical properties which differ from those of the crop seed.

Proper preparation of the seed is often necessary for complete cleaning. Efficient use of scalpings, debearders, and hullers can eliminate many cleaning problems as well as improving efficiency.

Capacity requirements

Efficient capacity is almost as important as complete cleaning. Cleaning machines of low capacity should be replaced with new machines which can operate efficiently at the desired capacity. Since a cleaner will be used for 10-15 or more years, the policy of buying a cleaner larger than present needs is not extravagance -- it is good planning.

The cleaning capacity of the plant is no higher than the capacity of the slowest machine. A low-capacity machine should be replaced with a high capacity model, or with a side-by-side parallel-feed bank of enough low-capacity machines to turn out the required capacity.

Cleaning sequence

A common problem which interferes with complete cleaning of crop seed is failure to pre-clean the seed properly before they are sent to the machine which must make a close separation. Machines must be installed and used in proper sequence so that seed

will be in proper physical condition for separation by the time they reach a separating machine. Examples: seed should be closely sized and precleaned before they are cleaned on a gravity separator; all inert material should be removed before crop and weed seeds are separated on a roll mill. A study of the flow sequences in Handbook No. 1, "Seed Processing and Handling Equipment", will illustrate the most efficient cleaning sequences.

Plant layout

A careful study of processing and handling operations, both of existing plants and planned new plants, will eliminate costly bottlenecks, increase capacity and cleaning efficiency, and lower processing costs.

To analyze and evaluate his processing operations effectively, the processor should first study and learn--

- (1) Correct processing sequences for his seeds.
- (2) Operating capacities of machines he needs.
- (3) Characteristics of elevators and conveyors needed.
- (4) Time required to process his seeds, motion and traffic flow patterns of workers during processing.

This information, combined with a study of the physical differences between his crop seed and the contaminants in them, will clearly indicate the separations needed, the proper cleaning sequences, and bottlenecks in the processing line.

Receiving - bagging

Seed must be received into the processing line, and then bagged off, as efficiently as they are processed. Bulk receiving - trucks, trailers, or forklift tote boxes - can reduce receiving costs and eliminate bottlenecks. Newer equipment such as vibropits and self-cleaning elevators make bulk handling more efficient than ever.

Bagging scales and packaging equipment now available to seedsmen can speed up bagging operations with less labor.

Every processor should carefully examine his receiving and bagging operations; they offer many opportunities to reduce costs and increase output.

Mixture Prevention

Contamination or actual mixture of seed lots is a real danger in every stage of processing. Lack of planning, faulty processing and handling equipment, improper identification, and inadequate cleanup all add to the problem.

Leaky elevators, distributors, and similar equipment which scatter seed should be replaced. Cleaners should be installed on frames or pillars to facilitate cleaning. Vibrator conveyors and other self-cleaning equipment should be used as much as possible. "Self-cleaning" steel bins with smooth interior surfaces should be used for all bin storage and surge bins.

Easy cleanup and mixture prevention must be planned into the selection and installation of machinery, and into the selection of building types and finish construction.

Cleanup equipment must also be adequate. In addition to brooms and brushes, an industrial vacuum cleaner and compressed air of 150 PSI should be standard cleanup equipment. The plant manager should also stress cleanup constantly, to create and maintain an attitude of care and quality-consciousness in all workers.

Complete Identity

Complete identity of every bag or lot is difficult to maintain through processing, bagging, storage, and shipping. However, good management practices can prevent loss or mixture of seed due to loss of identity.

A useful lot numbering system which provides basic information about the seed is one of the most effective methods of maintaining identity. The lot number, combined with a numbering system for bins and toteboxes, can provide full identification from the time seed are received until they are shipped or sold.

The plant record system should more than satisfy seed law requirements; it should be a management tool that helps maintain seed identity and provides inventory and shipping control. Minimum records include:

- Receiving records
- Drying records
- Processing records
- Packaging records
- Testing records
- Storage records
- Inventory records
- Sales/shipping records

Modern warehousing systems and techniques can also help maintain complete identity, as well as control inventory and shipping .

Evaluation and Improvement

Evaluation and improvement is quality control - the most neglected part of plant management, but the program which offers the greatest potential in cost-saving and profit-making .

An effective quality control program can be used to evaluate the quality of incoming field-run seed and the improvement - or damage - gained in each step during processing. It can pinpoint practices or processes which lower seed quality or cause losses, and can provide the information necessary for the continuing improvement and modernization of the processing plant to remain competitive and profitable .

Quality control as a management tool in seed processing is a simple process requiring a relatively low investment in equipment and training. It consists basically of taking samples of incoming seed, and analyzing the samples to determine the identity and amount of all factors which lower seed quality, such as weather damage, combine damage, inert, or weed seed. This information can then be used to select the cleaning machines needed to turn out high quality finished seed .

Sampling and analysis of good seed and all waste products from each machine can pinpoint its effectiveness in the processing operation, and determine the sources of seed damage or loss. Sampling and analysis after each handling - moving or storage - operation can pinpoint problems here .

A thorough sampling and analysis program, combined with a systematic quality control record system, can identify problems and spot trends that may otherwise be overlooked. It is an essential part of the efficient technical management skill which makes the difference between profit and loss. Modern seed processing has become a highly technical and competitive industry, in which a single skill is no longer enough to insure success. A successful plant manager must not only know seeds and separating machines, but he must be able to coordinate and integrate the entire flow sequence to determine and get the most profitable balance between equipment investment and labor cost, and to combine technical knowledge, process management, and managerial skill to produce the highest quality seed at the lowest cost.