

Mechanized Defeathering and Egg Sorting

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Summary

After slaughtering chickens for meat, they require scalding and defeathering, before cutting the carcass. When done manually, this step is time-consuming, reducing output, and posing serious occupational hazard to workers. Grading eggs to specified weight, size and color is also labor-intensive and inaccurate when performed by hand.

Mechanized defeathering and egg sorting systems are commercially available for smaller scale farm enterprises that increase throughput and improve product quality. When chicken reach target weight it is critical to process them quickly as the productive gain and feed efficiency decline. Defeathering equipment allows producers to quickly process chicken without damage and avoid rushed sales at a lower price. For eggs, different grades are demanded by hotels, restaurants, confectionery industries, and bakeries according to weight and color. Egg producers benefit from speedy, reduced handling costs and attracting premium prices for their highest-grade eggs. Mechanized sorting distinguishes grades faster and better than manual approaches, ease packaging and transportation, and reduce losses due to breakage.

Technical Description

Defeathering, also known as plucking, is the removal of feathers from carcasses. After chickens have been slaughtered, and the blood completely drained, the carcasses pass through a series of steps for removing different sets of feathers. The body is first submerged in hot water at 60°C for 2 minutes. Once scalded, the chickens are placed into a defeathering machines. These can typically handle four or ten chickens at a time, and the feather removal process is completed in only 30 seconds, whereas manual plucking typically takes several minutes per chicken. The removed feathers come out at an opening below the machine. Defeathered chicken are then passed on for evisceration where internal organs are removed. Systems for egg sorting are equipped with different sets of sensors that detect specific quality parameters like weight, color, shape, and cracks. Usually, a tubular lamp is fitted on the table so operators can see eggs that are “candled” while handling the infeed and packing. Egg graders consume little electric power and have very low maintenance costs.

Uses

Defeathering machines handle a wide range of poultry such as cockerels, broilers, turkeys, and old layers. Simple plucking drums that can handle one to five chickens at a

time are available for small and medium scale poultry producers. Egg sorting machines are versatile and can be used for any type of small bird like hen eggs, quail eggs, duck eggs and goose eggs. Different configurations of graders suit different needs and demands, with lower capacity machines being ideal for small free-range layer chicken farmers.

Composition

Most defeathering machines are made of a drum that is fitted with multiple high-speed rotating metal discs that bear rubber fingers. The movement of these protruding parts over the body removes the feathers. Egg sorting machines are made of a series of weight sensitive belts that allow eggs to roll onto spaces to received eggs of different grades. The calibration of these belts determines the sorting and thus a critical part of operations. Egg sorters may be coupled with collectors in cages and box loading machines for full automation.

Means of application

The capacity of the defeathering and egg sorting machines must be matched with the flock size and production line specifications. Both technologies require well-trained staff, and adequate water and electricity supply are required. Specialty slaughtering equipment are required to minimize animal suffering and keep meat safe. Once defeathered the whole chicken is coated to improve preservation or moved to a filleting line. A fridge or freezer is needed to safely store the meat. For eggs, after collection they are first washed using an odorless detergent solution with cool water to prevent it from moving through the shell. It is common practice to spray eggs with food-grade oil to reduce moisture loss and bacterial growth. Processing equipment is made of stainless steel and must be cleaned regularly for maintaining quality standards and prevent adulteration with foreign materials.

Agroecologies	All Agroecologies.
Regions	Africa South of Sahara.
Developed in Countries	Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Gabon, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.
Available in	Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Gabon, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.

Solution Forms	Equipment.
Solution Applications	Value addition, Agri-Food Processing.
Agricultural Commodities	Poultry.
Target Beneficiaries	Agro-dealers, Commercial farmers, Small-scale farmers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

When investing in mechanized equipment poultry farmers must have a good business plan with reliable market demand and prices. To match production volumes with machine capacities, there is need for technically competent personnel. It is necessary to understand environmental regulations and establish waste management procedures for successful mechanical defeathering.

Production Costs

A heavy-duty electric benchtop defeathering machine with a drum of 50 cm diameter that can process three to four broiler chickens in less than two minutes is sold for US \$550 by international suppliers, excluding taxes and shipment. Smaller models are available from US \$250. Rubber fingers for replacement inside the drum cost about US \$30 per set of 100. A medium-sized sorter with a capacity of 4,000 eggs per hour which can distinguish up to seven different grades costs US \$5,500 - \$7,000 without taxes and shipment.

Customer Segmentation

These automation technologies are suitable for poultry farmers with a few hundreds of chickens and may also be offered as a contract service. The use of defeathering and egg sorting machine saves costs and facilitates dressing and packing of chickens into various components.

Potential Profitability

A defeathering business handling 200 to 500 chickens per day can generate a 15% - 20% return on investment. Egg grading ensures that farmers achieve appropriate quality and pricing which promotes marketing and increases profit margins.

Licensing Requirements

National food safety and environmental regulations apply to chicken defeathering and egg processing, with licenses required for operation.

Innovation as Public Good

The solution is a regional public good disseminated by the International Livestock Research Institute.

Solution Images



Benchtop defeathering machine



Automated egg sorter

Institutions



Accompanying Solutions

[Value Addition and Storage Techniques](#)