

ALTERNATIVE TECHNOLOGY OF ANIMAL BY-PRODUCTS UTILIZATION

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Key words: animal wastes, sterilizer, dryer

Background

Utilization of animal waste is a serious problem for most of factories engaged in cattle, swine, poultry and fish processing. Part of raw material (of a high - risk) is burnt, and the rest (of middle-and low-risk) is used for fodder preparation (Directive 90/667/FEC). Many devices and technologies for sterilization and drying of wastes are applied. Occurrence of *Bovine Spongiform Encephalopathy* as well as possibility of transferring that disease into humans, made feed meal utilization ways and technologies are being verified. In many countries, prohibition for feed meal application in ruminant diet and its quantitative reductions in swine and poultry maintenance was introduced. Taking into account high nutritional value of feed meal produced from meat, blood or other by-products of low-risk, they could be utilized in swine and poultry farming. Feed meal applied as fodder needs proper conditions of their production and supplementation ways.

Objective

This paper was to prepare the technology and to design the line for animal by-products utilization with possibility to install it in every grain processing meat, poultry and fish. Production of feed meal should be performed according to accepted restrictions for meat processing. Thus, the raw material has to be segregated, stored, sterilized and dried in a proper way.

Technology

Utilization technology (Fig. 1) worked out consists in continuous sterilization of animal waste mixed with grain extracted meal at 110-150°C. Animal wastes (blood, bones etc.) are milled to obtain 3 mm particle diameter and mixed with plant raw materials (grains, soybean, maize etc.). Then, the mixture is added with animal by-product up to 30-50% share and sterilized and dried using designed and modeled utilization processing. Necessary basic devices such as sterilizer or dryer were separately constructed. Milling and mixing devices were adapted.

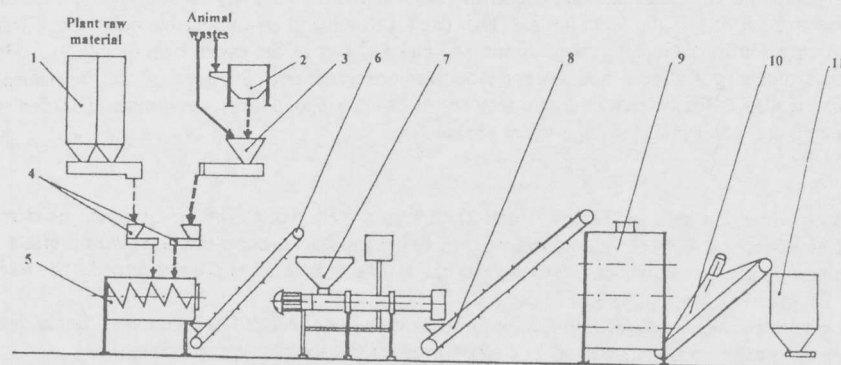


Fig. 1. Diagram of machines

1 - container of grain, 2 - container of animal wastes, 3 - shredder, 4 - feeder, 5 - mixer, 6 - conveyor, 7 - sterilizer, 8 - conveyor, 9 - dryer, 10 - cooler, 11 - container meal

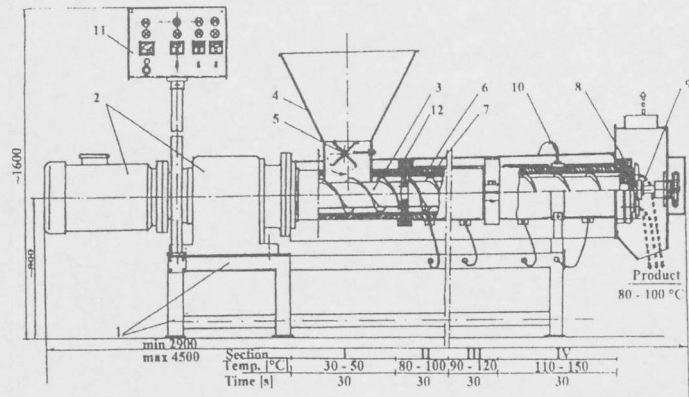
Sterilizer

Designed and constructed model of a sterilizer (Fig. 2) is a single-thread worm screw press with electrically heated cylinder. Segmented worm of variable geometry with a core rotating in the cylinder of module structure is a working element. Cylinder has ways fixed on the circumference extorting shifting and additional mixing of the raw materials.

Moto-reducer is applied as a drive. Charging hopper with stirrer that extorts raw material loading by the worm is situated on the first segment of cylinder. The last cylinder segment is equipped in a head with cylindrical holes. Hot product is cut by a set of knives propelled with separate electric engine. The device is equipped in a control box and desk where necessary tools for sterilizer regulation are placed (Dietrich 1986).

Fig 2. Sterilizer

- 1 - construction, 2 - motor, 3 - screw, 4 - basket, 5 - mixer, 6 - cylinder, 7 - heating element, 8 - head (collet), 9 - cutter device, 10 - temperature detector, 11 - electrical control panel



Dryer

Dryer (Fig. 3) for animal wastes drying applied in a designed processing line is a tunnel, three-belt, four-section dryer powered in a lower part with a heated air. Transporter belts are perforated metal nets spread on two cylinders and supporting rolls and independently driven with separate moto-reducers. Charging hopper is equipped in a pin-spreader that has to uniformly distribute the material being dried on the belt. Air of controlled temperature 100-130°C from heater is forced into dryer divided into four chambers from its lower part. Oil fired membrane heater of 160 kW power and 14 000 m³/h air capacity is used for air warming. Air passing through the product spread on belts takes the fumes to a chimney pipe where heat for heater is received due to membrane. Dryer is equipped in a system of heated air temperature measurements and regulation. Sidewalls of the dryer are made of thermally isolated tin profiles (Strumillo 1983).

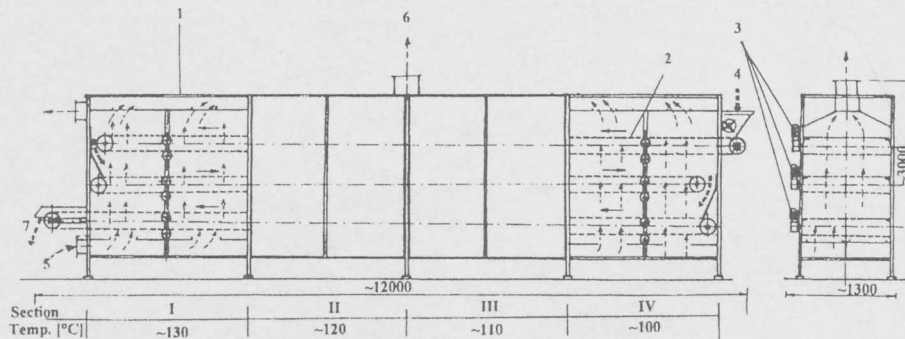


Fig. 3. Dryer

- 1 - casing of the dried, 2 - perforated betts, 3 - motor, 4 - finger spreader, 5 - inlet of heated air, 6 - stub pipe abstracting vaporus, 7 - product dried

Conclusions

Alternative utilization process can work at every processing manufacture (meat, poultry or other) where there is a need to apply useful animal wastes. It is characterized with generality, relatively low costs for construction and area required. it is little labor and energy-consuming recalculating onto one tone of product obtained. Preliminary study revealed full usefulness of product for preparing the industrial fodder. Efficiency of the line designed is 400-500 kg of product per hour at 30-50% share of by-product from meat processing.

References

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