



# Mechanical Processing of Feeds

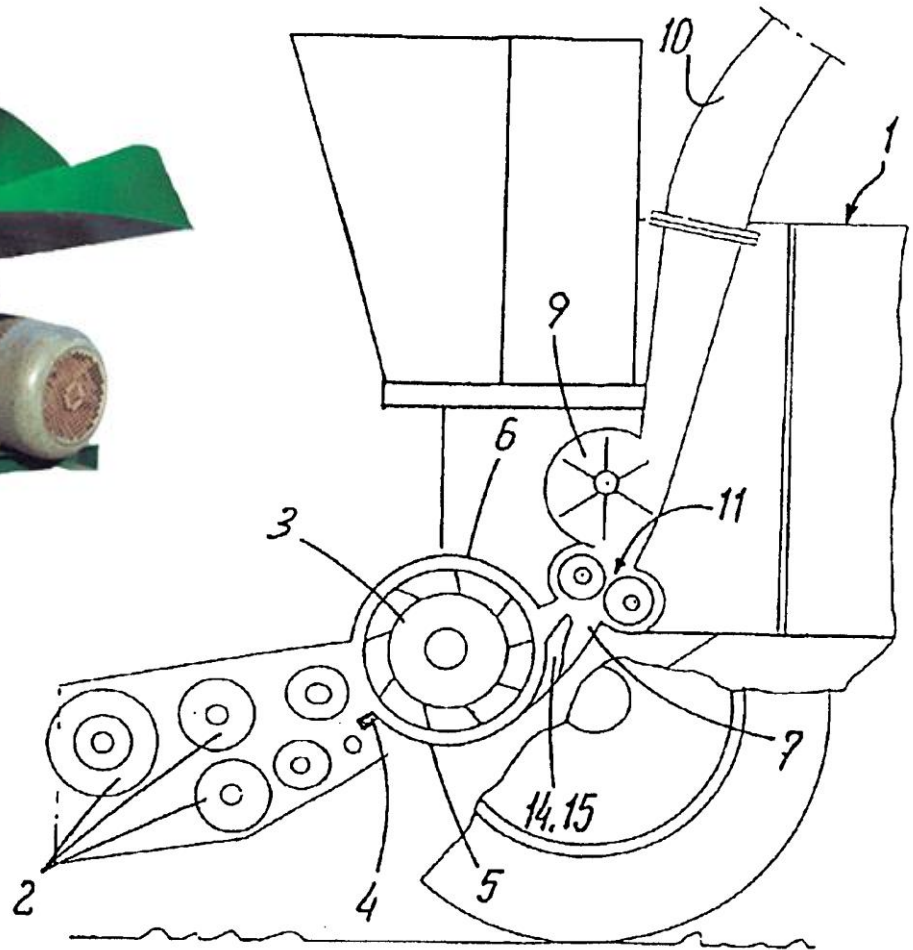
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# 1. Chopping (pencacahan)

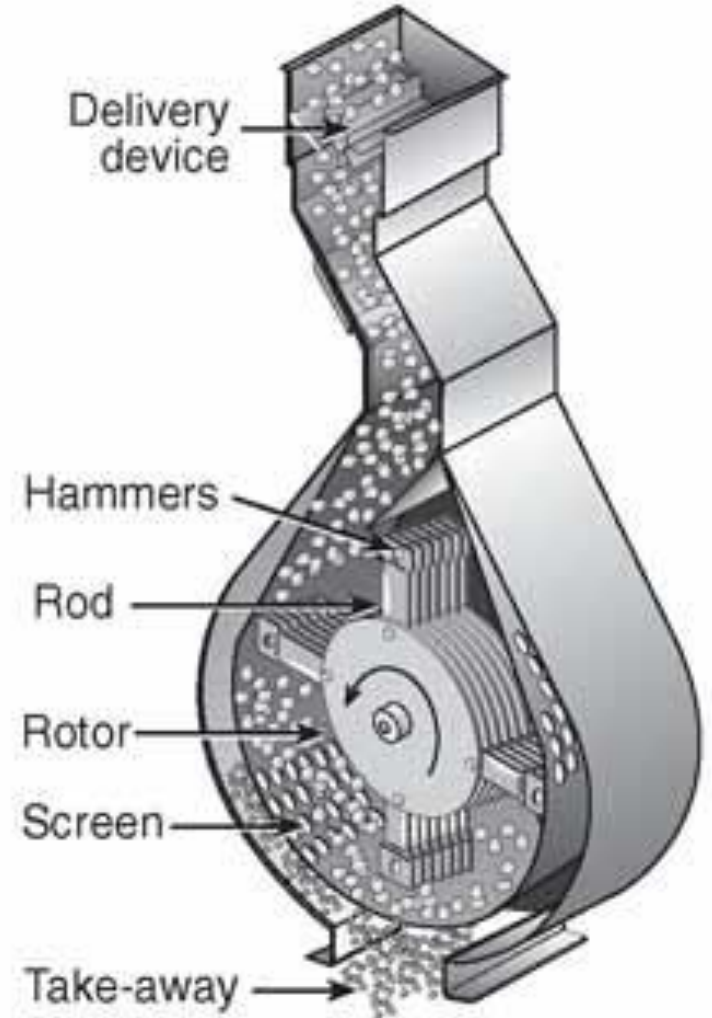
- Forage is chopped/cut mechanically into a smaller length (not less than 5 cm)
- Compared to unchopped forage: (1) easier to handle and mechanize, (2) can be stored in a smaller area at less cost, (3) fed with less feed refusal and waste, (4) may make for slightly greater production
- Low-quality, coarse forages are usually improved more from chopping than high-quality, fine forages
- Disadvantage: dusty
- May improve digestibility, but it does nothing to improve the nutrient content





## 2. Grinding (penggilingan)

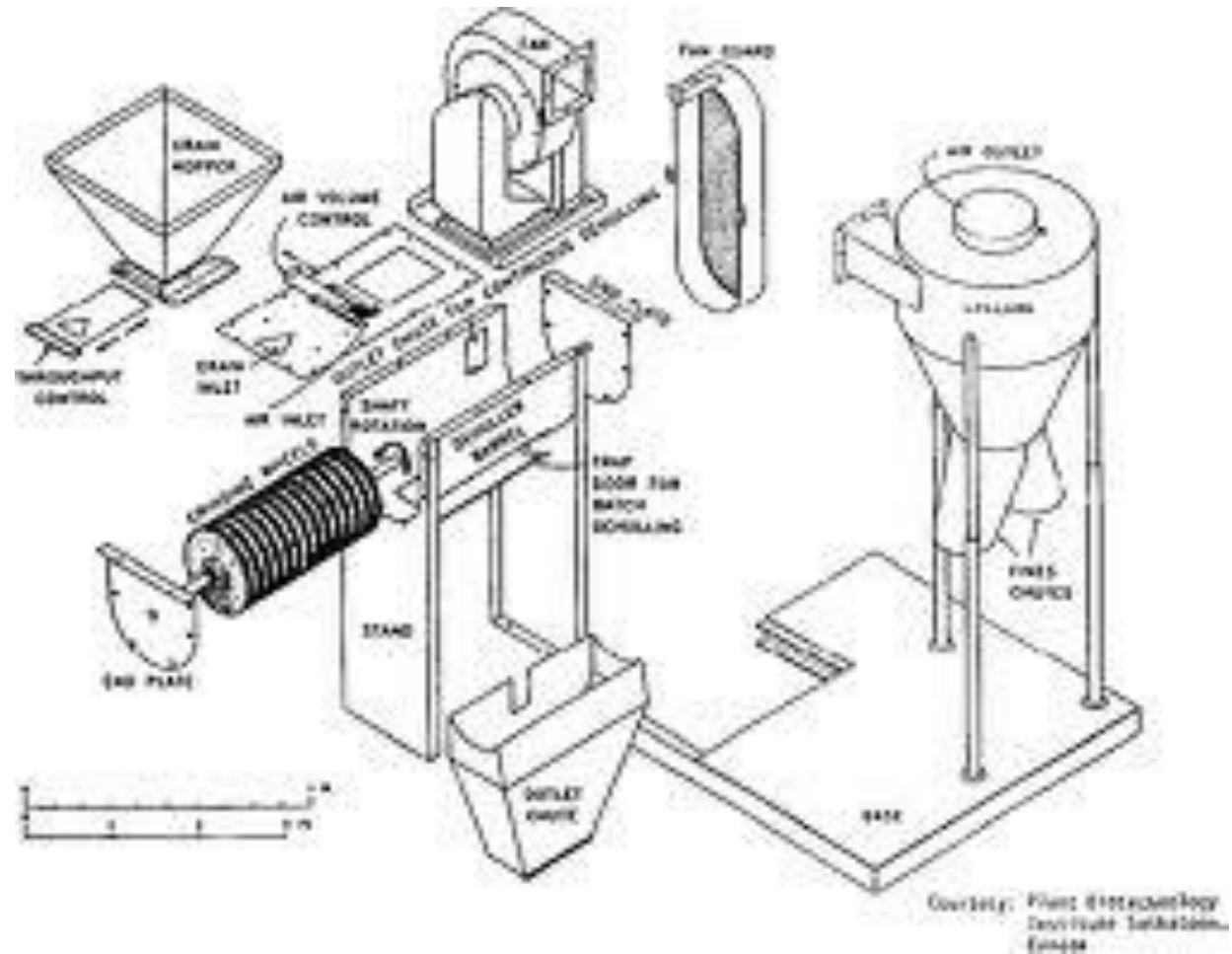
- Grinding is the process by which a feedstuff is reduced in particle size → reduce the particle size of a feedstuff until it passes through a screen of a certain size
- Using a hammer mill
- Medium-fine grinding is best; very fine grinding makes feeds dusty and lowers palatability → however, fine grinding may be desirable when pelleting is to follow
- May change the digestibility of cellulose and protein
- Fine grinding is normally for poultry or swine, while coarse one is for ruminant





### 3. Dehulling (pengulitan/pengupasan)

- Dehulling is the process of removing the outer coat of grain, nuts, and some fruits
- The hulls are high in fiber and low in digestibility by monogastrics
- Example: rice hulls, oat hulls, barley hulls

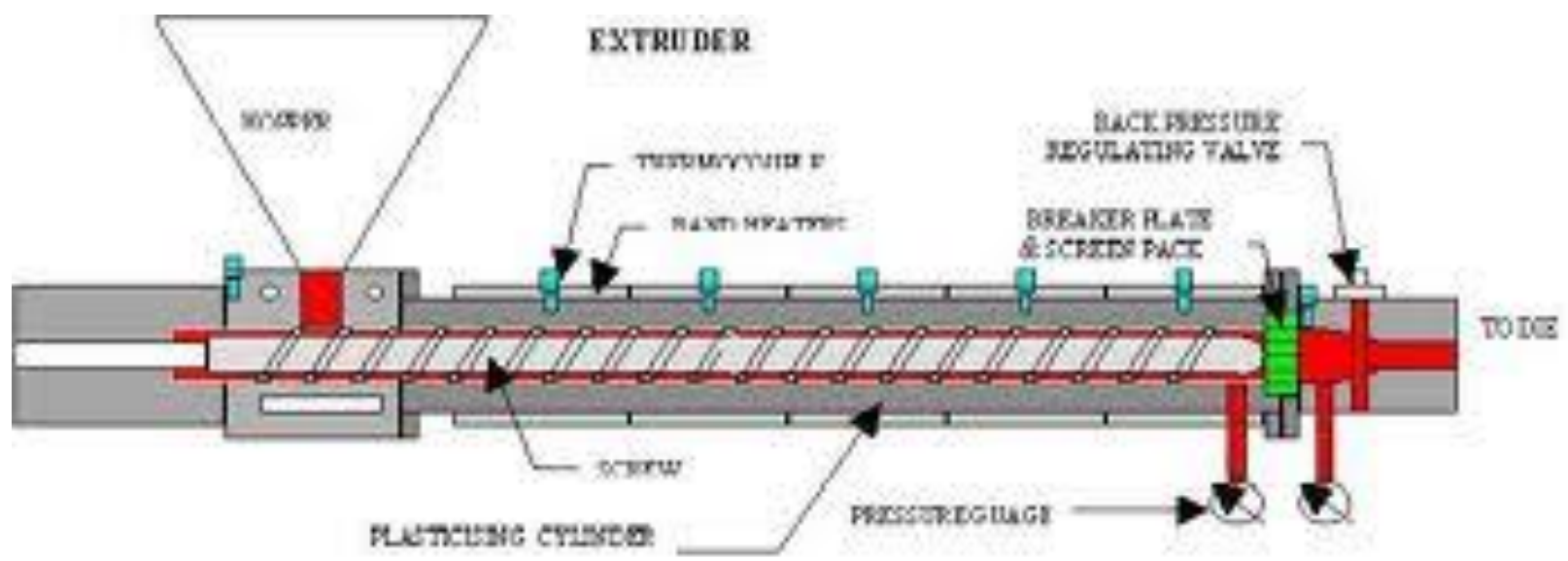




## 4. Extruding (gelatinization)

- Extruding is a process by which feed is pressed and pushed through constrictions under pressure
- Usually involves grinding the grain, followed by heating with steam in order to soften it, then forcing the material through a steel tube by an auger
- The expansion causes disruption of the starch granules
- In fish feed → proper extrusion procedures can sink or float the feed

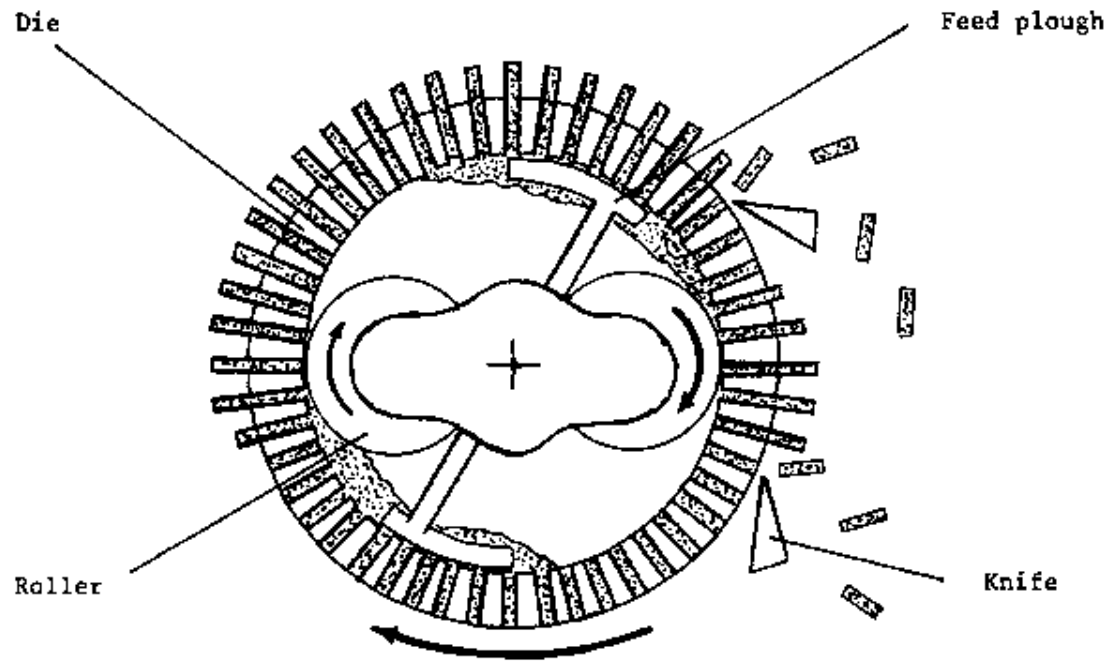






## 5. Pelleting (pembuatan pellet)

- Pelleting is the agglomerating of feed by compacting and forcing it through die openings by a mechanical process
- Pellets can be made into small cylinders of different diameters, lengths, and degree of hardness
- Grains and concentrates are pelleted for: (1) eliminating fines and dust, increasing palatability, (2) alleviating separation of ingredients and sorting, (3) increasing feed density – thereby lessening transportation and labor costs, (4) reducing storage space, (5) enhance nutrient availability, (6) destruction of heat-labile toxins
- But high-temperature steam pelleting may be detrimental to protein or amino acids availability





## 6. Crumbling

- Crumbles are crushed pellets
- They are made by crushing pellets into a coarse, granular form
- Crumbles are preferred by many poultry producers
- Crumbles retain the heating and density advantages of pellets, but alleviate the sometimes disadvantages of pellets being difficult to chew, swallow, and digest
- In comparison with ground feeds, crumbles have the advantage of being dust-free, irregular, and granular





## 7. Cubing/wafering

- Cubing/wafering refers to the practice of compressing long or coarsely cut hay into cubes/wafers
- Advantage: (1) lessens transportation and storage space, (2) decreases nutrient losses, (3) eliminates dust, (4) may increase feed intake, gain, and feed efficiency, (5) spread between high-quality and low-quality roughage is narrowed





## 8. Flaking

- Flaking is a modification of steam rolling in which the grain is subjected to steam either for a longer period of time or under pressure
- Flaking makes the starch fraction readily available to rumen microorganisms and enzyme degradation
- During flaking, feed is rolled into flat pieces, following either steaming at atmospheric pressure (steam flaking) or steaming under pressure (pressure flaking)





**Tropical Fish Flakes**



**Brine Shrimp Flakes**



**Color Enhancer Flakes**



**Spirulina Flakes**



## 9. Micronizing

- Within dry heat processing → surrounding the feed with dry air
- Micronizing is a dry heat treatment of grain by microwaves emitted from infrared burners
- Moisture is reduced to around 7%, then rolled to produce a uniform, stable, dry, free-flowing product
- Micronized grain is not popped



## 10. Popping

- Popping is the exploding, or puffing, of grain resulting from the rapid application of dry heat
- Popping grain for livestock involves the same principle as processing popcorn for people, and the results are similar
- Rapid heating by dry heat volatilizes the internal, natural moisture in the kernel until the pressure is great enough to explode it (to gelatinize and expand, or disrupt, the starch granules), causing the grain to puff out upon reaching atmospheric pressure





Thank you for your attention!