i'Tec_G10
June 2009

Keywords: Database, Pelleting, Durability

Survey of pelleting conditions and durability testers used at animal feed production plants

1. Survey principle

In 2008, Tecaliman conducted a survey with all its trade correspondents aimed at updating the industrial database on certain pelleting characteristics and practices current in France.
This involved a fairly simple questionnaire - a chart that listed 7 animal classes (Dairy cattle, Beef cattle, Rabbit, Pig, Piglet, Poultry and Turkey), which had to be completed by indicating the various pelleting conditions: die compression length; die diameter, and minimum and maximum setpoint temperatures. An additional question asked for details on the type of durability tester used. The survey was later supplemented by a record of the production output of each respondent plant.
The plants that took part in the survey represent a production of 7.8 million tons, i.e. a representativeness index of over 35% of French production in 2008.
The results obtained for the 7 feedstuff families were used to identify and analyse current main trends in France. The results were expressed as a median value (50% of the population above and below), along with the minimum and maximum values, and was presented in chart format. Referring to the median helps to minimise the impact of outliers on global trends.
Tecaliman has not deleted any of the values it received, which explains why some minimum and/or maximum results derive from isolated or atypical practices.

2. Press dies

2.1. Channel diameters

The chart (Figure 1) illustrates the differences in die channel diameters for each family of animal feed. Despite the disparity, certain general trends can be identified.
The medians lie at 4 mm for beef, rabbit and pig feeds, and at 3.5 mm for piglet, poultry and turkey feeds.
In terms of minimum and maximum values, the results spread shows diameters ranging from a maximum of 6 mm for beef cattle, and a minimum of 2 mm for piglet feed. While the median for beef cattle feed lies at 4 mm, it is important to note the strongly asymmetric distribution pattern. It should be noted that pig and piglet feeds show a reversed asymmetry pattern.
Generally speaking, pellet diameter depends on the size of the animal for which the feed is intended. However, most diameters lie between 3.5 and 4 mm, irrespective of the feedstuff family.

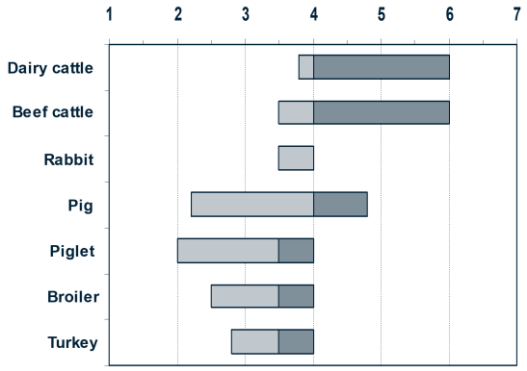

Figure 1: Channel diameters (mm)

2.2. Die compression rate and thickness

The die compression rate, a dimensionless number, is calculated based on the following equation:

$$TC = \frac{EC}{D}$$

TC = Die compression rate
EC = Die compression thickness (mm)
D = Die channel diameter (mm)

For most feeds, compression rates (Figure 2) lie around 18.5, with the exception of turkey feed, which is characterised by a rate of 21.4. The populations are fairly symmetrical.

The excessively low minimum rate (8.6) for poultry feed is explained by one single result.
Compression thicknesses (Figure 3) lie between 60 and 75 mm, with larger thicknesses observed in beef cattle and rabbit feeds. Beef cattle populations show a more asymmetrical distribution pattern.

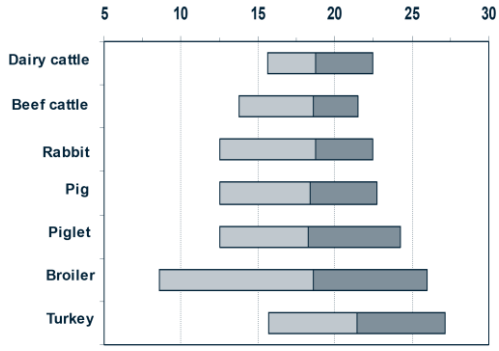

Figure 2: Compression rate (thickness/diameter)

Certain thickness are very large (> 120 mm), which can be explained by the occasional use of dies with 6-mm channels.

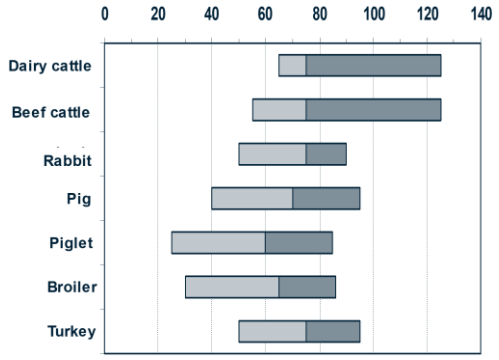

Figure 3: Compression thickness (mm)

3. Treatment temperatures

Two temperature values were recorded: minimum and maximum.

3.1. Minimum temperatures

The lowest minimum temperatures (Figure 4) were recorded for beef cattle feed at 45 and 50°C.

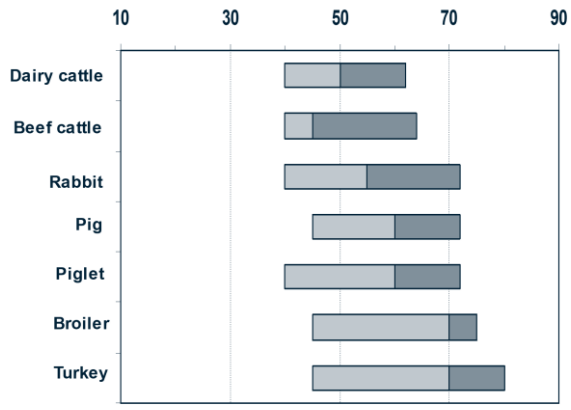

Figure 4: Minimum temperatures

Rabbit feed is treated at a minimum of 55°C. Pig and Piglet feeds at 60°C, while Poultry and Turkey feeds recorded the highest minimum temperatures (70°C), allied with a strongly asymmetric population pattern.

3.2. Maximum temperatures

In keeping with minimum temperature values, maximum temperatures (Figure 5) corresponded to Poultry and Turkey feeds, with readings at 75 and 80°C.

Beef cattle feeds are pelleted, with a maximum median value of between 60 and 65°C, and a high maximum at 80°C. The median for Rabbit and Pig feeds also lay at 65°C. Piglet feed values are slightly offset at 70°C.

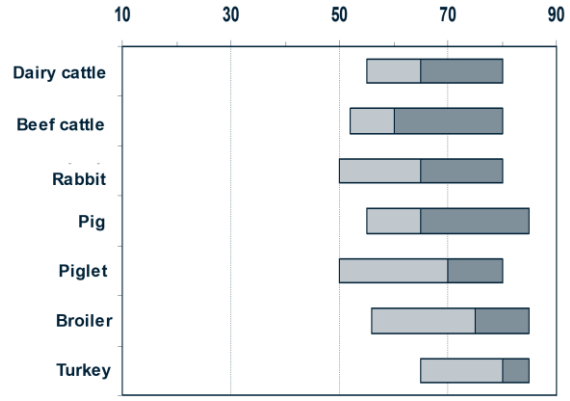

Figure 5: Maximum temperatures (°C)

The minimum temperatures recorded at certain production sites intersect with the maximum temperatures at other sites. This clearly demonstrates the variability in the range of applied temperatures.

4. Durability testers

The last question asked which durability testers are used at the plants. The answers revealed that there are currently 4 types of durability tester in use in France:

- Eurotest
- Rotating drums
- Holmen
- Lignotester

Their representativeness (Figure 6: Representativeness of the durability testers) is given as a proportion of production tonnages.

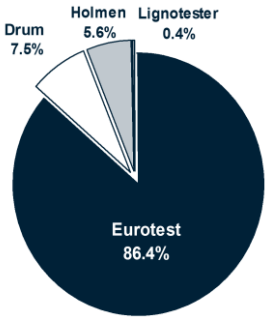

Figure 6: Representativeness of the durability testers

The Eurotest device, with a score of 86%, appears to be gaining a reputation as a benchmark trade product.

5. Conclusion

Tecaliman would like to thank all the professionals in the animal feed sector who took the time to reply to our survey. The survey findings will make it possible to carry out studies under conditions similar to those found in an industrial setting.