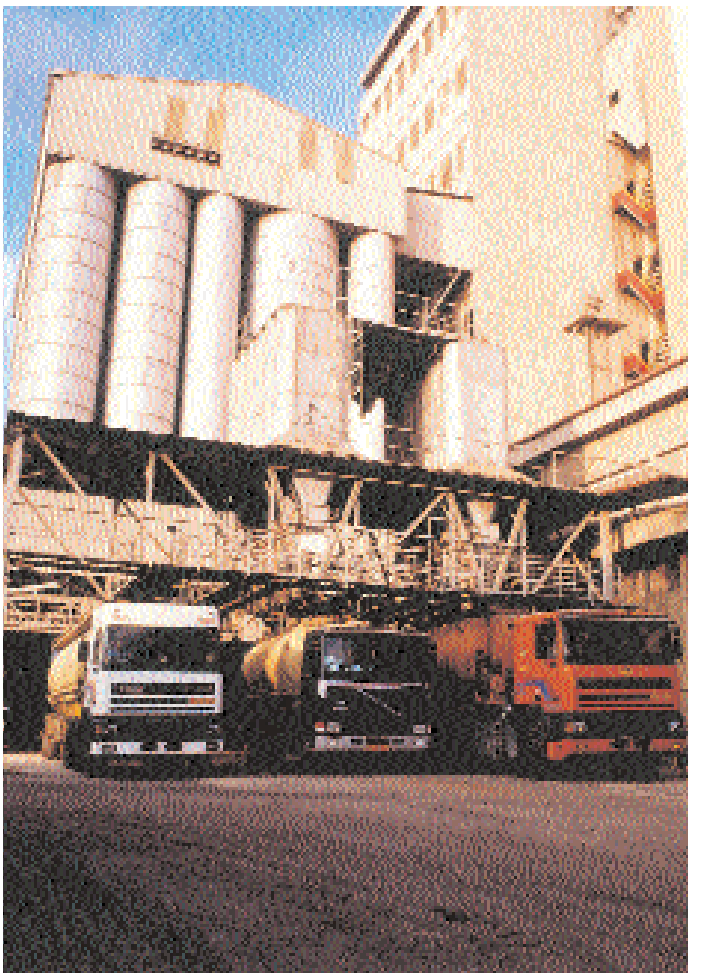
Basic improvements can

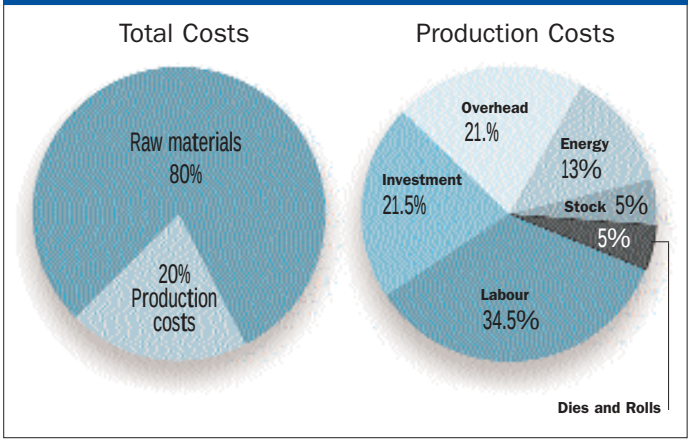
Why does the day-to-day production of similar batches of feed vary so frequently? Why can the number of operators in feed-mills with similar specifications differ 50% or more? Why do some feedmills deliver generally just in time and others have long lead times? It's a matter of market, product range and quality level. But not only these: by means of an efficient production and/or management system, a lower cost per tonne can be achieved.

By Harm Klein, Tebodin CCE Deventer, The Netherlands, Email: info@tebodincce.nl



Generally the cost price for complete feed is made up of 80% purchase costs of raw materials and 20% of costs for production and transportation (*Figure 1*). Often we – as technical consultants and engineers – meet typical examples in our international markets, where some reduction of this 20% cost can be achieved by limited investment. Cost reduction can be found by technical improvements, increase of capacity or in the field of operational efficiency. In this article we describe some production methods and procedures for the manufacture of feed that can easily lead to basic improvements – with interesting investment and pay back time.

Fig. 1 - Example of cost division for animal feed, production 800 tonnes/day



Efficient production methods are characterised by a good level of automation, production and maintenance planning and order handling. Operators are well skilled with the attitude to be flexible: in the control room and on the pellet press floor, for sampling and maintenance, for intake and hand addition. Day shifts can be staffed by two or three operators, nightshifts by two; both excluding bagging-off. These conditions are of dominant importance, and not only for the smaller feedmills.

Capacity restrictions

Where is the bottleneck in the process? After clarification of this topic, improvement can be realised. An analysis generates key-information; this is the method required to make the real situation clear. This analysis or quick scan can be restricted, however

reduce production costs

it has to be realised fundamentally. The result of such a study often shows that the origins of the bottlenecks deviate from earlier premises.

According to the results of the analysis, the essential steps in order to remove the bottlenecks differ: is it by increasing the capacity of a conveyor, (extra) buffer bin, larger or faster main equipment, improvement of the control system or something else.

Dosing of raw materials

The reason that the hold-up in the process is the dosing system can have several causes. Perhaps the number of silos is insufficient; this can be solved by installation of more silos in an efficient way. If the dosing silo will be extended with some large silos, regularly many smaller silos will be available because in the past large components were divided among many small silos. It is preferable to install silos with dosing equipment connected to the dosing weigher, instead of the raw material silos being connected to the dosing silos.

Converting of pre-grinding to post-grinding results in better silo management, lower energy and maintenance costs and higher efficiency and flexibility (= lower production costs). Splitting of dosing weigher(s) results in shorter dosing time generally; the same advantage if the dosing weigher has been equipped with a chute or valve and extended with a hopper fitted with redler or belt conveyor.

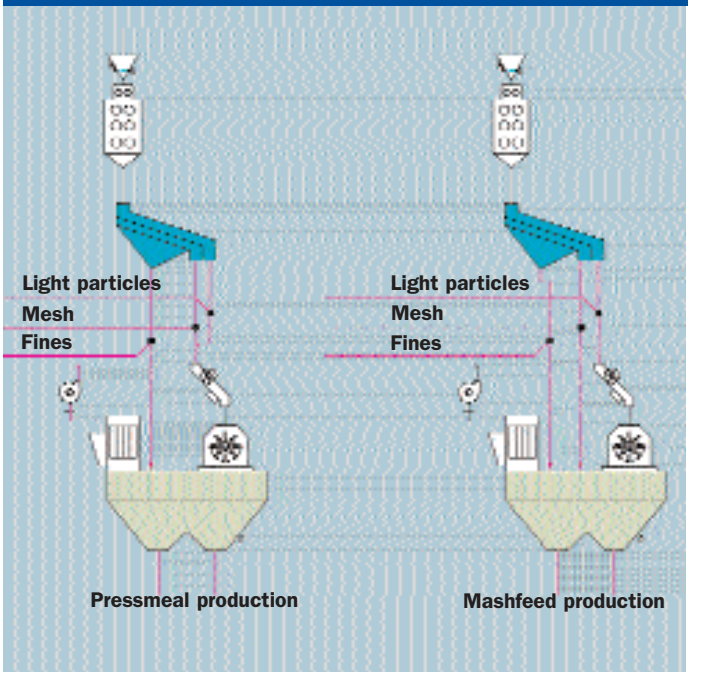
Capacity is often restricted because of a hand intake in the mixer. Possibilities for improvements: decreasing time for hand intake (containers, big bags, logistical improvements), automatic dosing, buffer bin under hand intake, high speed mixer. The cycle time can be reduced in this case substantially. However, also here exchanging of the mixer can be prevented sometimes, if other (real?) bottlenecks can be eliminated.

Grinding and mixing

When the grinder is fed by only one bin, too often it is waiting for product, especially during changing of formulas. By adding a bin in series or better in parallel position, waiting time will reduce substantially. By improving the aspiration system an important increase of the grinder capacity can sometimes be obtained.

By installing a roller mill on top of the grinder, not only rolled mash feed can be produced, but also products pre-ground by the roller mill and post-ground by the hammer mill (*Figure 2*) increases the hammer mill capacity substantially (for mash feed and for press

Figure 2 – Higher capacity and lower energy use can be achieved by installing a roller mill on top of a hammer mill



time of the mixer. If no other possibilities, such as separate silos for components not to be ground, are available, this addition needs an efficient procedure. The combination of pre-selected components on one pallet or container, close to the control room results in shorter time for manual addition. Many systems are available and some are very efficient for this purpose. The filling, mixing and emptying procedure of the mixer is relevant for an optimal use of the mixer.

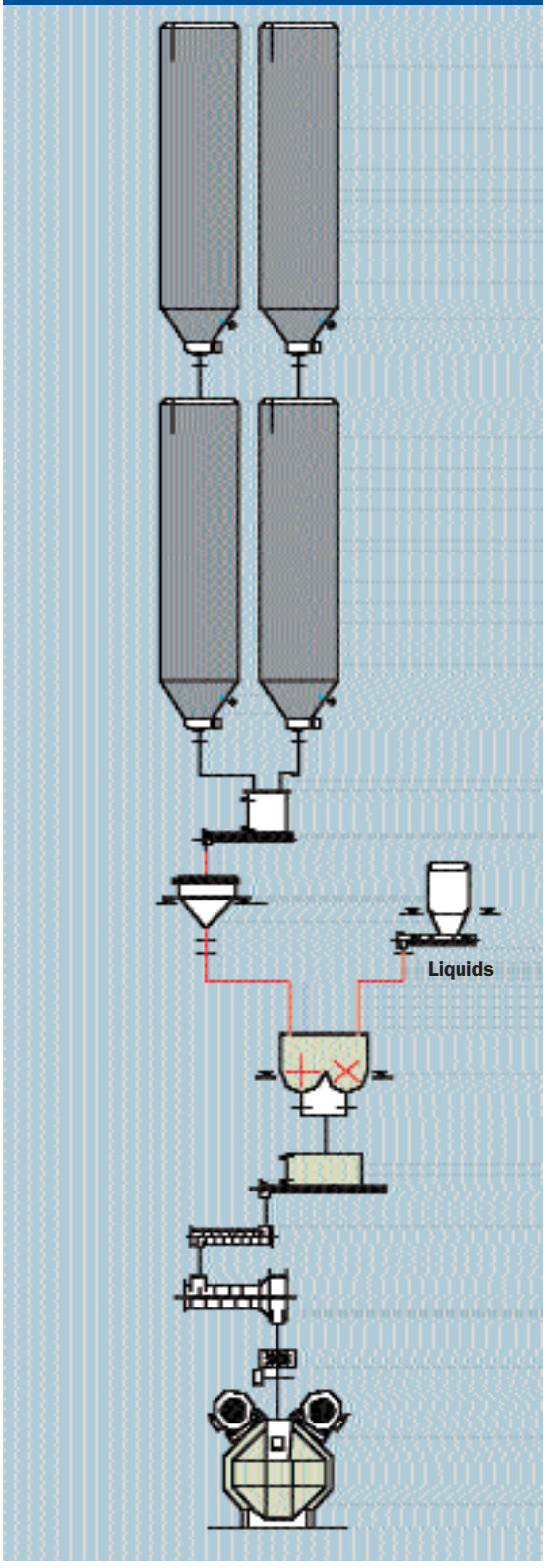
Pelleting

For efficient pelleting it is important to look at the number of bins feeding the pellet mill. The minimum should be two bins of sufficient size, which are further suitable for badly flowing product, minimal contamination and improved hygiene-aspects.

For conditioning an efficient balance has to be found in relation to retention time, dynamic and thermal energy. In the case of components with low and medium energy content, conditioners with smaller drives are recommended. The results are lower energy and maintenance costs without negatively effecting product quality.

For frequently recurring small batches, a special pelleting line can be installed with a smaller press and

Figure 3 – A separate pelleting line for special products increases capacity



cooler with intermediate bottom. If the pelleting line has been used for medical mixtures, a small mixer above the press (*Figure 3*) can be considered. Efficient handling of fines and dust is crucial in order to get a flexible line without waste of time during product changeover. The other larger pelleting lines will produce the longer runs.

Finished products

For finished products storage, loading and transport costs can be extensive. Operationally this part of the feedmill has to be seen as separated from the production: production should "never" be dependent on the capacity of the shipping department.

There are many specific load-out systems available, each for its own application. A better efficiency can for example have a positive influence on:

- tonnes/h rate of the feedmill (= higher production capacity respectively shorter production time)
- delivery time, products available just in time
- occupation rate of the trucks

In order to determine the precise situation where after the improvements can be achieved an analysis has to be carried out. Important aspects have to be written down, not only on capacity and number of recipes, but also on flexibility, separation matters of main and minor importance, type of weighing, blending and sieving, crumbling, etceteras. Contrasets have to be considered. One has to decide what to do with medical mixtures, heat-sensible additions, additions of grains and so on. Bulk blending has attractive benefits in most cases (*Figures 4 and 5*).

Automation and control

By using the right automation and control tools operational costs can be lowered. For optimal use of the mechanical equipment we want to emphasise the need for reliable and dedicated sensors. Many production interruptions are not caused by mechanical failure or problems with the control system but are due to an improper sensor or lack of a sensor in a critical position. This also requires high maintenance awareness towards sensors and the electrical installation in general.

Improvement of production capacity for an existing plant very often can be realised by optimising the control system. There is no standard solution; every feedmill has its own specific characteristics and production scheme. In practise improvements of 10% have been achieved by using maximum intelligence and flexibility in the control system both for the

Figure 4 - Blending installation with belt conveyors

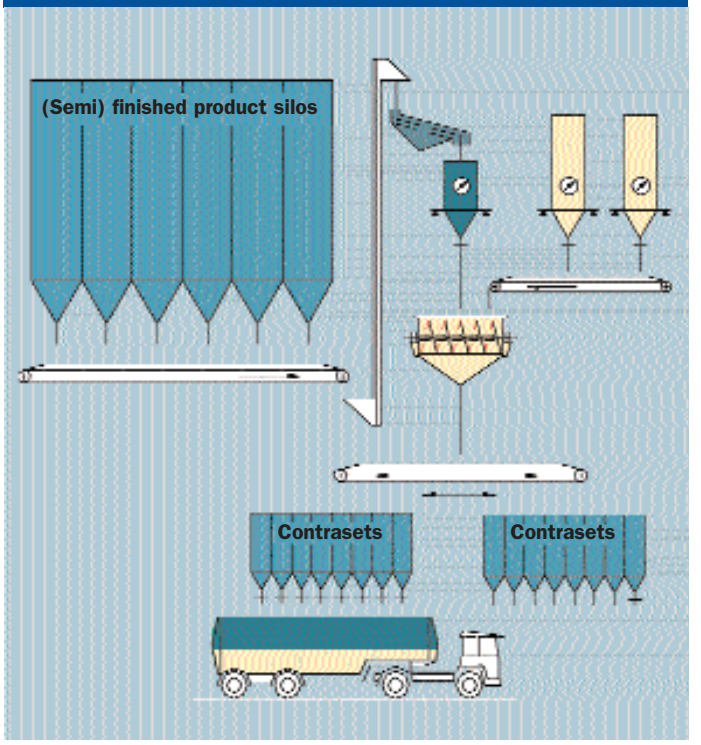
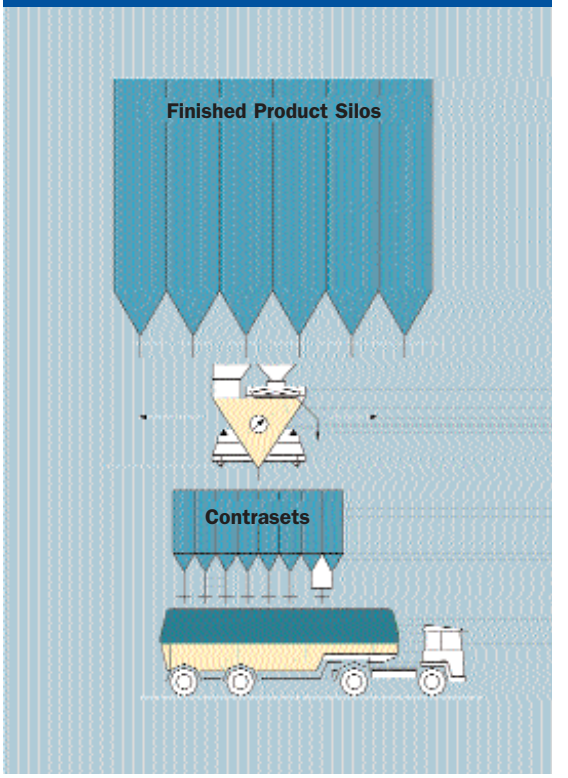


Figure 5 – Bulk blending with belt conveyors gives greater flexibility in load-out



batching system and the pelleting lines. It pays off to make an analysis of existing bottlenecks and search for potential improvements.

Nowadays product variety has increased significantly, which resulted in a large variation in formulations and process steps. This can easily lead to a decrease in plant output and reduced efficiency.

In order to be able to produce such a broad range of products a flexible and integrated automation concept is vital. In a modern feedmill manual data handling is impossible.

All products and process parameters are related with so many rapidly changing data, that only an integrated system can cope with this complex process. Besides that there is the requirement of tracking and tracing, which also cannot be fulfilled without a proper automation solution. Cost savings cannot only be found in processing and production solutions, but especially in logistical functions.

Nowadays powerful, flexible and user friendly solutions are available for the feed sector, which cover order processing, production preview, raw material requirements, optimised production planning and take into account all production and plant constraints, transport planning and just-in-time delivery.

Modern database functions and handy tools in the supervisory system allow operators to monitor and analyse the performance of individual production runs and the overall plant performance. Similar tools are used for monitoring energy consumption, production costs and other efficiency related parameters including maintenance management.

Finally

One bottleneck (mostly only a minor detail) can seriously influence the efficiency of production. After optimising the process flexibility can improve, a higher capacity can be reached and high investments can be prevented. Because of the big variety in solutions, which are available in modern feed production, one of them can be of high importance. The market sets the price of raw materials, but regarding production costs, variety is available and has to be handled as efficiently as possible. ●