T20 Mobile Toaster

1 THE CASE

A **Danish subcontractor** would like to extend his range of services by inserting toasting in his catalogue.

To this end, to purchase the toaster most appropriate for the needs of possible customers, he performs some technical and market analyses including:

- **The daily ration** of food for one head of livestock generally includes about **1kg of soybean or** lupin
- **A typical dairy farmer manages an average of 100 dairy cows** and needs about 100kg of soybean a day Dried soybean can be stocked an average of 20 days. This allows the dairy farmer to always have a fresh dried product available
- **The local livestock holdings** in the territory are **medium/small-sized**. For most of these farms, installing a soybean toasting system would be too costly and out of their reach. These farms could take advantage of the ideal solution provided by the toasting service offered by the subcontractor performed at their farm itself.

Considering the large number of dairy farmers in the area, the Subcontactor decides that this is the category of the market to apply for. The quicker the toasting service is carried out, the more profitable it will be.

Figure 1: Mobile T20 at work

2 TOASTING CEREALS AND BEANS

Soybeans can be **toasted** like other products such as fava beans, rapeseed, wheat, lupin, mainly aimed at **making them more digestible (by deactivating the trypsin inhibitors), improving taste and absorbing proteins.**

This makes it possible to meet the different requirements of farms based on the type of animals reared (**monogastric or polygastric**), on the diet and, last but not least, on how much they can spend.

By comparing the main nutritional elements of cereals and beans (Table 1), we can see **that soybean is the most nutritious**. While other types of grains (e.g. oats, wheat, barley, etc.) can be considered secondary in the diet of these animals as they have a low vitamin content though contributing to supply energy, fibres and minerals.
Peas can also be used to complete the amino-acids offered by soybeans with their 22% of protein, while rapeseed is mainly a favourite due to its high energy content.

Table 1 – Comparison of the nutritional elements of some cereal and beans Source: USDA Food Composition Databases

Nutritional elements /100g	soybean	lupin	beans	corn	oats	rapeseed	wheat	peas
Proteins (g)	36	36	24	3	17	0	14	5
Fats (g)	20	10	1	1	7	100	2	1
Carbohydrates (g)	30	40	63	19	66	0	71	14
Calories (kCal)	446	371	347	86	389	884	339	81

3 THE SOLUTION ADOPTED

The customer needs a **Toaster which is both mobile**, quick in the drying process and efficient to make this toasting service available to several farms. He chose the **MECMAR T20** toaster capable of producing approximately 2tons/h of soybean, to **satisfy about 2 – 3 customers a day** according to their geographical distances.

The toaster is equipped with **a towing drawbar, 2 axles with wheels and parking feet** to allow for fast and easy mobility.

To make it easy to switch on the toaster, it has a **Plug&play system** with a 380V three-phase electrical socket inserted in the electric panel to supply the necessary **12kW** for its operation.
The **diesel oil burner** was designed so as to be able to connect the fuel exhaust pipe to any type of tank.

Figure 2: Detailed view of the front of the T20 toaster in transport configuration

Further accessories were applied to the loading and unloading systems of the toaster to provide maximum flexibility of use in relation to the different environments in which it operates:

- the **loading auger** requires a **safe and stable** position during transport and needs to be quickly and easily connected when it reaches destination **to be able to load from the three sides**: front, left and right.
  The auger was also designed to perform **preliminary cleaning** eliminating sand, leaves and pieces of straw which are unwanted both inside the toaster and in the toasted product.
- **The discharge auger** is mounted on a rotary flange which **unloads the product on a 180° span** to find the best position to discharge the toasted product, whether a silo, trailer or on the ground.

Figure 3: T20 mobile Toaster in work configuration