

A GUIDE TO A POULTRY FEED UNIT

1 - PRESENTATION

1-1 Nature of the Activity

The unit is directly related to the industrial and artisanal poultry raising of the country or the region. It uses local raw materials to a maximum (corn, sorghum, cotton expeller cake, soy, peanuts...) and supplies farmers with complete feeds.

1-2 Alternatives

* Raw Materials

The unit will introduce technological knowledge and experience in animal nutrition which will allow the use of available products (many raw materials may be used).

* Finished Products

There are several possible levels of completion for finished products :

- More or less complex formulae : raw materials chosen to optimize production costs, but also to respond to a species' needs (or several species' needs) according to their stages of growth and their physiological state. The formulae are complemented by addition of vitamins and minerals (VMC : Vitamine + Mineral Compound).

- Presentation of finished products :

. as flour : a blend of raw materials that runs the risk that the poultry may consume only certain elements of the feed,

. as granules or crumbs, of homogenous composition. The size can be adapted to the animal's age or species. This is an easier format for handling and transportation.

* Technology

The technological options are linked to the industry's needs, the capacity of the unit, and local infrastructures.

- Raw material silos : allow bulk storage of principal raw materials (cereals and expeller cake). This is recommended, if not required to keep down bag handling costs, and to facilitate automation. Stored products are directly transferred to processing workshops by handling chains.
- Premixing or precrushing : workshops can be constructed to :
 - . premixing : raw materials are dosed, then "premixed". They are crushed together in one crusher before a more efficient mixing in the final phase.
 - . precrushing : raw materials are crushed separately (one or more crushing circuits), stored in hoppers, dosed and then mixed. This is adapted to large capacity units that work continuously. This method is interesting financially if there are special tariffs for electrical energy consumption at night.
- Granulation : workshops which, in their simplest form, produce flour, can be completed with granulating machinery (die press, cooler, crumber), allowing presentation of product in granules.
- Extrusion : large units can include an installation for extrusion of certain raw materials (e.g. whole grain soy), in order to render them integratable.
- Installation to prepare mineral and vitamin complements by dosing vitamins and minerals.

1-3 Types of Possible Units

- Unit A : small capacity (3 t/hr), using mainly local sack-delivered raw materials (except for imported VMC's). If there are protein deficiencies, concentrated vitamin and nitrogen mineral complements can be procured. They can constitute up to 30 % of the formulae. This unit has a somewhat restricted range of formulae. This unit caters to a local market of small poultry farmers who are spread out, or the unit can be integrated into a large raising scheme, producing its own feed. The process is simple : manual dosage of components, crushing, mixing. Finished products can be bagged right after mixing, or granulated and then bagged. To reduce setting up and starting costs, the unit can be delivered already set up, in the form of 2-3 containers, which can be superposed.

- **Unit B** : medium capacity (10 t/hr). Ideally, this unit uses local indispensable raw materials (cereal and expeller cake). If this is not the case, competitively priced imports should be found, keeping in mind transportation costs and customs barriers. The unit has a wider range of finished products (about 20) for poultry and ruminants, and aims at a developed regional market or domestic market. It is equipped with storage silos which allow for automated handling.

- **Unit C** : large capacity (15-20 t/hr). This unit is multipurpose and proposes a wide range of finished products. It is highly automated, especially for receiving, handling, and bulk expedition. Production should be well adjusted to the market's needs.

Road, rail and water transportation should be thoroughly researched.

2 - TECHNICAL AND ECONOMIC GUIDE

2-1 Description of the Unit

2-1-1 Finished Products

UNIT	A 3 t/hr finished products	B 10 t/hr finished products	C 15-20 t/hr finished products
Product range	a few formulae	greater range of formulae	large range
Presentation	granules, flour in bags	granules, flour in bags and bulk	granules, crumbs in bulk (and bags)
Production	16 hr/day	20 h/day	24 hr/24 hr
- daily	50 t/day	200 t/day	400 t/day
- annual	10 000 t/yr	50 000 t/yr	100 000 t/yr

2-1-2 Technological Choices

OPERATIONS	TECHNOLOGICAL OPTIONS	SOLUTION		
		UNIT A : 3 t/hr	UNIT B : 10 t/hr	UNIT C : 15 t/hr
Receiving	Bags or bulk	bags	Bags and bulk. Maybe swinging bridge	Mainly bulk swinging bridge
Raw materials	+ or - mechanized storage and handling Addition of vitamin and mineral complements	bags manual handling Possible addition of nitrogen concentrates	Approx. 4 silos (corn, expeller cake) Mechanized handling Imported standard premixes	Much storage machinery Mechanized handling Possibility of adaptation to large number of formulae : on site vitamin and mineral mixing
Dosage mixing	+ or - mechanized	Manual dosing	Semi-automated dosing	Automated dosing
Crushing	Premixing or precrushing	Premixing	Premixing	Possible precrushing
Granulation	Granulation press	Possibly	yes	yes
Crumbling	Crumblers	Possibly	Possibly	yes
Packaging of finished products	Bags or bulk	Bags	Bags	bulk, mainly

2-2 Economic Analysis

2-2-1 Investments

UNIT	A 3 t/hr	B 10 t/hr	C 15-20 t/hr
EQUIPMENT	FOB price US \$	FOB price US \$	FOB price US \$
Operations :			
<input type="text" value="Silos"/>		\$ 300 000	\$ 500 000 to \$ 800 000
<input type="text" value="Crushing
Mixing"/>	\$ 50 000	\$ 80 000	\$ 1 to \$ 1,3 million automation \$ 240 000
<input type="text" value="Agglomeration"/>	\$ 120 000	\$ 160 000	
<input type="text" value="Packaging"/>	\$ 30 000	\$ 50 000	
EQUIPMENT TOTAL	\$ 200 000	\$ 600 000	\$ 1,8 to \$ 2,5 million
Buildings			
Storage			
The unit	20 m2	200 m2	250 m2
Raw material storage	300 m2	500 m2	700 m2
Finished product storage	200 m2	500 m2	1000 m2
Other investments			
Electrical power :	100 Kw	300 Kw	800 Kw
Steam	150 Kg/h	400 Kg/h	800 Kg/h
TOTAL INVESTMENT			
(Equipment + building)	\$ 0,5 million	\$ 1,1 to \$ 1,6 million	\$ 3,4 to \$ 4 million

2-2-2 Functioning

	1	2	3
Management			
- Skilled labour	1 x 8	3 x 8	3 x 8
- Unskilled labour	5 x 8 + 20 x 1	5 x 8 + 20 x 1	5 x 8 + 20 x 1
Raw materials	cereal : 8000 t concentrates : 2000 t	cereal : 34 000 t vegetable and animal proteins : 13 000 t by-products and complements : 3000 t	cereal : 65 000 t vegetable and animal proteins : 25 000 t by-products and complements : 10 000 t
Energy			
- Electricity	200 Mwh/yr	1000 Mwh/yr	3000 Mwh/yr
- Steam	500 t/yr	2000 t/yr	5000 t/yr

3 - KEY FACTORS TO THIS PROJECT'S SUCCESS

3-1 Supply

The regularity of supply is a major limiting factor. The unit should be able to function autonomously (for up a month or more) using that which is invested in storage.

3-2 Technology and Equipment

The most complicated equipment to use is the press, especially in little-automated units.

3-3 Personnel

The production chief could undergo training in an animal feed factory. He should be helped or be able to take care of high-levelled electro-mechanics for equipment maintenance.

For a medium or large capacity unit, a technico-commercial director is necessary : he buys raw materials at competitive prices, adapts formulae, and prospects future clients .

In these units, teams of trained foremen are indispensable.

3-4 Distribution and Commercialization

The unit's location should be the result of a compromise between supply costs and the proximity of regions of poultry raising.

In some cases, it is preferable to construct several units close to the raising areas than to construct a larger, central unit.

Try to limit storage by adapting production to demand. Large units require appropriate logistics and marketing.

The unit can advise poultry farmers, with the help of nutritional service firms.

3-5 Financing

The unit should be paid off in 5 years (approx.). A significant amount of working capital is needed to correspond to the period of immobility of raw materials and storage of finished products. It can go as high as the equivalent of two months' turnover.

4 - INDUCED ACTIVITIES

The presence of a feed-producing unit is often the necessary condition for the emergence of a poultry farming chain : it can lead to the creation of new farms and their induced activities.

The unit can be integrated into a production chain which on one end produces raw materials and practises incubation, and on the other end includes a slaughterhouse.