

TOBACCO RESEARCH BOARD

P. O. Box 1909, Airport Ring Road, Harare

Tel: (+263 4) 575 289 – 94

Telefax: (+263 4) 575 288

FIELD SERVICES DIVISION

Barn Designs and Types

There are several barns at TRB which include rocket barn, bulk curers, plastic barn, conventional barns and tunnel system barns

Rocket barn

The Rocket barn was designed for use by small scale farmers. It has resulted to a “revolution” in the technology of flue curing by providing ancillary benefits in the form of affordability, efficiency and quality of the tobacco product. This barn uses a wood furnace with natural draught convection. The barn can have 4 tiers up by 5 tiers wide. The barn can cure up to $0.7\text{ha} \pm 0.2$ ha depending on the size of leaf. The energy efficiency of the barn is ± 4 kg of wood to produce a kg of cured tobacco



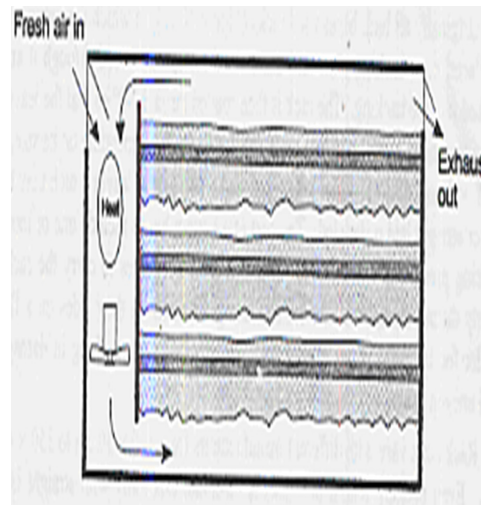
FRONT VIEW



HEAT EXCHANGER

Bulk curers

It is a condensed version of the ordinary fan barn and the difference is that leaves are held in frames (racks) instead of string or clips. The barn's mode of operation is the same as that of down draught barns. The barn can cure up to 2ha \pm 1ha depending on the size of the leaf. The energy efficiency of the barn is ± 1.5 kg of coal peas to produce a kg of cured tobacco



BULK CURER

INSIDE VIEW

Plastic Barn

The barn was designed for beginners and low income small scale tobacco growers. Basically it is a 4 m × 4 m × 4.5 m structure with a capacity of holding up to 360 clips(0.5 ha). Temperatures of 70°C are achievable and a turnaround time of 6-7 days has been attained. For one to build a plastic barn, 500 farm bricks, 37 tree poles (mapango) and 80 m² of 250 µm black polythene plastic are only required. Usually the barn have 3 tiers up by 5 tiers wide and it can cure up to 0.6 ha .The energy efficiency of the barn is ±4.5 kg of wood to produce a kg of cured tobacco.





FRONT ELEVATION

BACK ELEVATION

HEAT EXCHANGER

Conventional Down draught

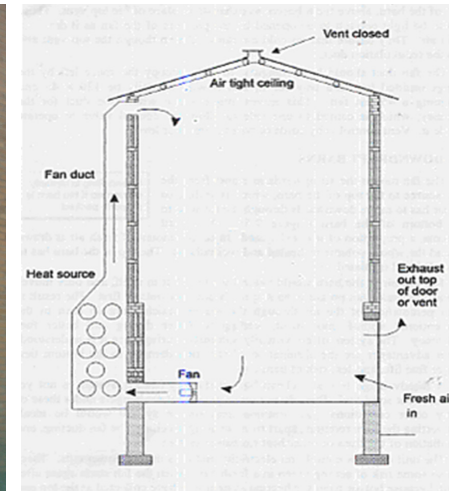
It has an airtight and insulated ceiling to prevent heat losses-no top vent. A fan moves air upwards to the top of the barn. The proportion of the air is exhausted and an equal amount of fresh air is drawn in. The whole volume is reheated and re-circulated. It can be operated as single units or several units using a single heat source. Usually the barn has 6 tiers up by 10 tiers wide. The barn can cure up to $3\text{ha} \pm 0.5\text{ha}$. The energy efficiency of the barn is ± 2.5 kg of coal cobbles to produce a kg of cured leaf.



FRONT ELEVATION



BACK ELEVATION



CROSS SECTIONAL AREA

Conventional up draught

The barn operates using natural convection. Air is forced to rise through the tobacco by the heat from the flues. As it reaches the top of the barn, it begins to move downwards towards the flues to be heated again and the process continues- bottom vents are ducted under the flues and top vent for exhaust. As the colouring progresses some of the air will be allowed to leave the barn through the top vent, while allowing in ambient air through the bottom vents. The barn can have 7 tiers up by 5 tiers wide. The barn can cure up to $2\text{ha} \pm 0.5\text{ha}$.



SIDE VIEW

Continuous Tunnel system

The tunnel consists of compartments derived from the three phases of curing. Thus, the colouring compartment, drying and conditioning compartments. Clips are placed on trolleys in the field and wheeled through the tunnel to emerge only after conditioning in the untying shed. The green tobacco is loaded into the colouring compartment and trolleys are moved relative to the airflow. The temperature increase as the tobacco approaches the drying compartment after which they are pushed into the conditioning section after drying. Exhaust air is used to condition the dry tobacco and partly re- circulated to control the wet bulb. The barn can cure up to 120 ha of tobacco .The energy efficiency of the barn is ± 1 kg of coal nuts to produce a kg of cured leaf.



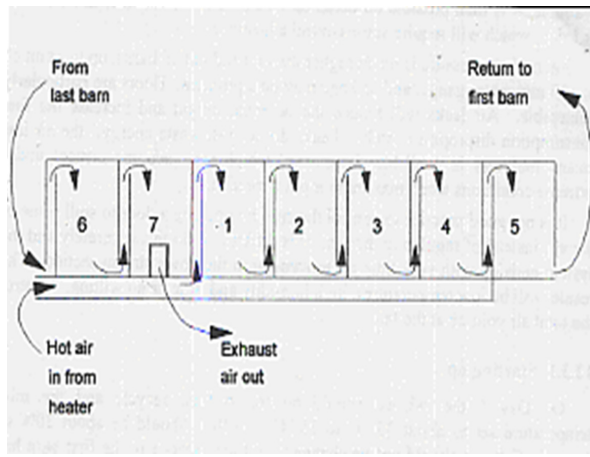
TUNNEL SYSTEM BARN



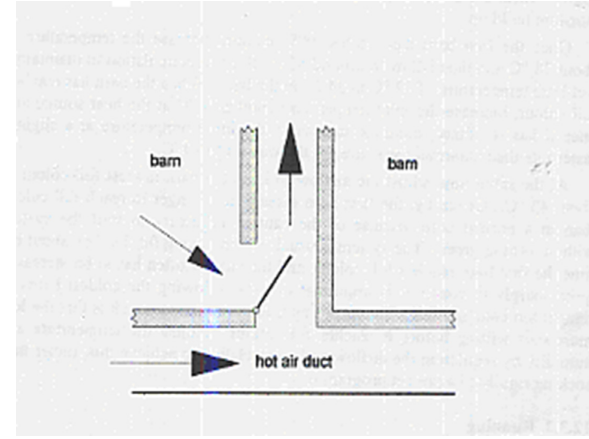
INSIDE VIEW

Continuous Cascade system

The barn consists of eight barns connected in series and supplied by a single heat source. Separate hot air duct may be connected to any one of the barns that is at mid rib drying stage. From this barn, the hot air is then passed through each barn in turn before being exhausted from the coldest colouring barn. Every 24 hours the inlet hot air is diverted to the next barn. The first is cooled, conditioned, offloaded, refilled and reconnected to the airflow at the end of the series to become the last one in line.



Principle of cascading



Detail of inlet/ transfer