

The Dried Salted Duck Drying Machine

◆ Abstract

With the further development of China's economy, more and more attention has been paid to the deep processing and consumption of meat products. Cured Meat processing will be developed in the direction of green, pollution-free, sanitation and safety, and the utilization of green energy in agricultural production, especially in drying process, will become more and more extensive.

Traditional production process control use of coal, firewood as traditional drying system of energy, the high energy consumption and environmental pressure, and even to burn the whole furnace control risk, complicated structure, etc. In conclusion, to improve the atmospheric environment, energy conservation is a trend of the development direction and future industry guidance of agricultural products in China.

Introduction of production and processing technology of duck.

The processing of traditional control from autumnal equinox to severe cold season, from the beginning of winter to it is the best season to make control, this is affected by seasonal temperature relationship and duck fattening and manufacturing quality, only depending on the processing season and early control points (mid-september to late October), middle (early November to early December) control, advanced control (mid-december to next January), including the best quality with the advanced control. In general.

The manufacturing technology of duck is mainly including duck selection, slaughter treatment, modified shape, curing, using duck drying machine to dry duck and packaging, etc, and the following is a detailed description of the products methods.

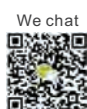
Methods/steps

- Duck choice: choose the fat flax duck, its flesh is delicate and plump, the quality is excellent. Because it is fat, the animal's fat is distributed in the muscle fiber, better taste good, the finished product is smooth and the meat is delicate and delicious.
- Slaughter treatment: the duck should be on hunger strike for 12 to 24 hours before slaughter, and give sufficient water, let duck to rest quiet. This will allow the slaughter to bleed well and reduce the chance of undigested food contamination carcasses. After the slaughter, the carcass should be cleaned, removed and should be cooled immediately. The carcass of the duck was selected without fracture and blood stasis, and the duck was removed from the elbow joint and the lower end of the hock.
- Modified shape: cut the carcass from the left side of the abdominal sternum, cut the chest along the mid-abdominal line, remove the viscera, wash off, dislocate the joints of the limbs, press the bone disc flat, and cut the ribs along the spine on both sides into eight characters, commonly known as the arm eight characters. But do not hurt the flesh layer, avoid cutting skin, and cut anus about 1/3, trim into oval, ready to pickle.

- Pickling: pickled after experimental improvement, the ingredients can be mixed with salt (for reference) 3.6, sugar 1.8, sodium nitrite 0.01, white pepper 0.05, pepper 0.1. When using, pepper with a little salt and then cool it down. Mix the above ingredients with dry salt and rub them evenly on the inside and outside of the duck, especially on the legs, chest and neck. Marinate the ingredients in a 5°C freezer for 4 days.
- Water stains: salted ducks are rinsed once with warm water at about 40°C to remove the remaining salt, and then washed with 15-20°C cold water for 2 times, removing residual viscera and dirt and dripping dry.



- Drying process and using method of duck drying machine: dry duck body and modify it, hung on bamboo pole, put into air energy drying room. Taking the air energy duck dryer as an example, the drying parameters are set up as below:
 - A> firstly, set temperature 45°C to dry about 6 hours.
 - B> Secondly, move the duck to a cold air. Keep at temperature about 15°C for about 5~8 hours, so that the body of the duck is shaped and the skin appears milky, if drying once. The skin is easily dark brown, poor appearance.
 - C> Thirdly, after cooling, the ducks were be drying in 45°C hot air.



■ Brief introduction of Heat pump Dryer

Heat pump drying is a kind of drying technology which uses evaporator to cool and dry air and recover condensation heat from condenser. Under the same conditions, heat pump drying can save 20% ~ 50% energy. Has been used in wood, grain drying, food processing and textile industry. Heat pump for drying, processing, dehydration of garlic slices, ginger slices, high rehydration rate of products. The application of drying technology to the drying of Chinese medicinal materials can ensure the quality of dried products, and the color, appearance and active components of Chinese herbs can be protected properly in heat pump drying. Using heat pump to dry velvet antler, Huaishan, Beiqi, panax notoginseng, maca, etc. It can better maintain the original color, flavor, active ingredients and active substances. At the same time, the heat pump drying technology has the advantages of high efficiency and energy saving, low cost, no pollution of the environment, and can accurately and independently control the temperature, humidity and airflow velocity of the drying medium. This essay discusses the application of heat pump drying technology to the drying of plate duck.

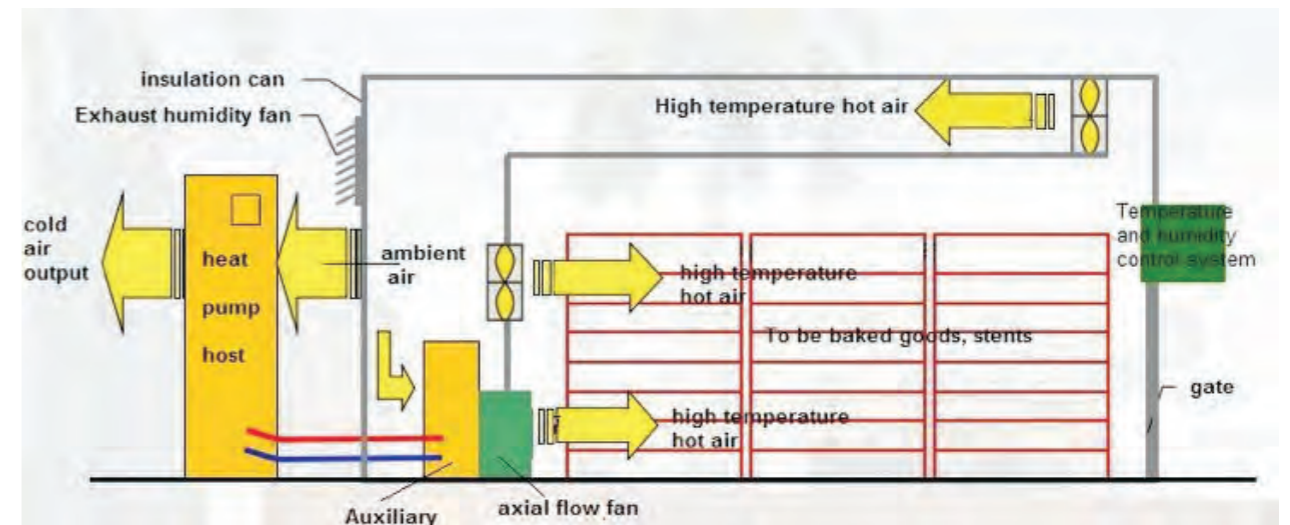


Picture 1: dryfree air pump plate duck dryer working pictures

■ Principle of heat pump dryer

The high temperature heat pump dryer unit mainly consists of four parts: wing plate evaporator (outside machine), compressor, wing plate condenser (inner machine) and expansion valve. By allowing the working fluid to continuously complete the thermal cycle of evaporating (absorbing heat from the outdoor environment) and condensing (releasing heat in an indoor drying room), Thus, the heat in the external low temperature environment is transferred to the drying room, and the refrigerant circulates in the system under the action of the compressor. It completes the process of raising the temperature of the gas in the compressor (the temperature is up to 100 °C, it enters the machine and releases heat to heat the air in the drying room, and at the same time it is

cooled and converted into a liquid flow, when it moves to the outside machine, The liquid state is rapidly evaporated into gaseous state, and the temperature can be reduced to -20 °C ~ 30 °C. The air around the heat absorber will transfer the heat to the refrigerant continuously. The high temperature heat pump dryer unit, like ordinary air conditioners and heat pump units, absorbs the energy in the evaporator in a low temperature environment, QA: it consumes part of the energy by itself. That is, the compressor consumes electricity QB: through the refrigerant circulating system in the condenser, the heat release QC(QC=QA+QB) is carried out, so the efficiency of the high temperature heat pump dryer unit is $(QB+QC) / QB$, while the heating efficiency of other heating equipment is less than 1, so the high temperature heat pump dryer unit is heated. The efficiency is much higher than the efficiency of other heating equipment, It can be seen that using high temperature heat pump dryer as drying unit can save energy and reduce CO₂ and other pollutants emissions, to achieve the effect of energy conservation and emission reduction.



Picture 2: dryfree air source heat pump dehumidifier system principle

◆ Problems Existing in The Production and Drying Of Plate-Duck :

- At present, the plate-duck is mostly used in the traditional drying method of , that is, heating and drying method of the return fire tunnel in the oven, which has the following problems :
- The heating temperature is too high. Traditional drying technology, heating temperature is not easy to control. The general heating temperature is about 75°C to 90°C, but the drying temperature of plate duck should not exceed 55°C.
- The drying time is too long. Using the traditional method, it takes at least 24 hours to process 1 ton of plate-duck. Even if the drying effect is not good, the phenomenon of reheating and drying will occur occasionally.
- Energy consumption is high. In the traditional drying process, the thermal efficiency is low, which is about 30%-60%. During the drying process, the heat of evaporation moisture is about 36%, the loss of waste gas is about 58%, the dry material takes away heat 2%, and the heat loss of dryer is 2%, the thermal efficiency is only 40%.
- There are hidden dangers to safety. Since oil drops occur in the drying process of the duck, the traditional drying equipment is heated by a blower that sends the hot air mixed with mars into the oven. Once mars encounters the oil fat dripping from the duck, there is the risk of burning the whole oven of the duck. In Suichuan County, Jiangxi Province, there are one or two cases of duck burning every year.



◆ The advantage of Air-energy Heat pump Plate Duck Dryer :

■ Energy conservation :

Energy saving is the starting point and the main advantage of heat pump application.

■ Good quality of dry products :

Heat pump drying is a mild drying method, close to natural drying. The evaporation rate of surface moisture is close to that of internal moisture moving to the surface, so that the quality, color and grade of dried articles are good.

■ Drying parameters are easy to control and can be adjusted in a wide range :

In the process of heat pump drying, the temperature, humidity and circulation flow of circulating air can be controlled accurately and effectively. The range of temperature adjustment is $-20\text{ }^{\circ}\text{C}$ $100\text{ }^{\circ}\text{C}$ (with auxiliary heating device), and the range of relative humidity adjustment is $15 \sim 80$, which is suitable for drying thermosensitive materials.

■ Environment-friendly :

Material drying requires not only high quality and low energy consumption, but also environmental friendliness. Based on the same evaluation criteria, heat pump effects on global warming are small compared with electrically released CO_2 . Environmental friendliness is the advantage of heat pump drying. At present, the application of heat pump to reduce CO_2 emissions is advocated in foreign countries, and it will be applied further.

■ environmental benefit :

No pollution to the environment, created a clean and harmonious working environment and production environment, laid the foundation for the sustainable development of enterprises, for the future of enterprises and scientific and technological innovation and industrial structure adjustment, has carried on the powerful impetus. In line with man and nature, the law of coordinated economic development.

■ conclusion :

The use of heat pump drying technology marks a new direction and a new field for dehydration drying of agricultural products. It has a strong impact and challenge to the traditional ways of drying agricultural products and drying equipment. At the same time, the application of heat pump technology is in line with the national and local governments to promote energy conservation and emission reduction, low-carbon production and life, comply with the development of the times, it is irresistible, in both economic and social effects played a major role. It is a good example for enterprises to implement and promote the goal and action of sustainable development, which is persuasive and beneficial to the people.

◆ Dried Salted Duck Drying Case.

