INTRODUCTION

Nowadays, liver could be considered as a by-product of pork meat industry, it represents approximately the 3% of pork carcass weight. Current commercial use of pork liver is very limited being used as animal feeding in many cases. Liver presents a high protein and low fat content, which makes it a potential protein source. The recovery of protein requires a previous dehydration stage in order to avoid the interference of the moisture.

Preliminary results have revealed that liver dehydration is a slow process and a very high energy demand operation. Therefore, the use of high power ultrasound could be useful to intensify the drying stage shortening the drying time and reducing the energy consumption.

This work explores the feasibility of using airborne ultrasonic application to improve the water removal during hot air drying of pork liver and the effect of the ultrasonic power applied is assessed.

MATERIALS AND METHODS

Pork liver was obtained from a local market in Valencia (Spain) and vacuum packed for freezing. Subsequently, cylindrical samples (diameter 12.6 mm and height 15 mm) were obtained for the drying experiment. Freezing was necessary to obtain defined geometry samples.

Drying experiments were carried out in an ultrasonically assisted drier (Fig. 1). Tests were performed at 30°C and 1 m/s applying different ultrasonic powers (0, 30 and 50 W), which was defined as the electric power supplied to the airborne ultrasonic power transducer.

RESULTS AND DISCUSSION

Average initial moisture content of pork liver was 2.71±0.21 kg water/kg dry matter. Airborne ultrasonic application shortened drying time.

The effect of power ultrasound application on drying rate was dependent on the power applied, thus, the higher the applied power, the faster the drying. Thereby, the drying time needed to reach a moisture content of 0.5 kg water/kg dry matter was reduced by 220±23 min if experiments without power ultrasound application are compared to those carried out at the maximum applied power (50 W) (Fig. 2). However, at low ultrasonic powers (<30 W), the influence of power ultrasound on drying rate was not significant (p>0.05) (Fig. 2).

The diffusion model applied provided an adequate description of the drying kinetics (explained variance higher than 98%). Ultrasound application increased the effective moisture diffusivity by up to 21.8% (Fig. 3).

CONCLUSIONS

Further studies should elucidate if the time shortening caused by the ultrasonic application is linked to an energy reduction in order to corroborate if ultrasonically assisted hot air drying may be considered as a promising technique for industrial dehydration of pork liver.