ABSTRAK

Mesin pengering berbasis siklus kompresi uap dengan sistem aliran udara tertutup digunakan untuk mengantikan metode pengeringan konvensional mengunakan panas matahari dalam proses produksi pelet pakan kelinci. Tujuan penelitian ini adalah (a)membuat mesin pengering pelet pakan kelinci yang aman, praktis, efisien, ramah lingkungan serta dapat digunakan kapan pun, (b) mengetahui waktu pengeringan pelet pakan kelinci tercepat yang dihasilkan mesin pengering pelet pakan kelinci yang dilakukan dengan sistem aliran udara tertutup, (c) mengetahui karakteristik mesin pengering pelet pakan kelinci meliputi : kondisi udara di dalam ruang pengering pelet pakan kelinci ($T_{A,\ db}$. $T_{A,\ wb}$, $T_{B,\ db}$, T_{evap}, T_{kond}, $T_{D,\ db}$, $T_{D,\ wb}$), suhu dan tekanan kerja (evaporator dan kondensor). Perhitungan mesin siklus kompresi uap dengan diagram P-h meliputi (Q_{in}, Q_{out} , W_{in}, COP_{aktual}).

Penelitian dilakukan secara eksperimen dengan mesin berbasis siklus kompresi uap sistem aliran udara tertutup, dengan ukuran box mesin: panjang 120 cm, lebar 120 cm, tinggi 120 cm, diameter lemari pengering pengering : 120 cm, lebar 120 cm, tinggi 240 cm. Mesin pengering ini mengunakan mesin siklus kompresi uap dengan daya 785 watt, dengan tambahan 2 kipas total daya 90 watt. Variasi pada penelitian yaitu menggunakan 2 kipas dan tanpa menggunakan kipas di dalam lemari pengering. Mesin pengering menggunakan sistem aliran udara tertutup dengan komponen utama : evaporator, kondensor, kompresor, pipa kapiler, dan *filter dryer*.

Mesin pengering dapat bekerja secara optimal.Waktu pengeringan tercepat didapat dengan variasi mengunakan dua kipas selama 120 menit. Dari hasil penelitian pada menit ke-90 dengan menggunakan dua kipas di dalam lemari pengering didapatkan hasil (1) kalor yang diserap oleh evaporator persatuan massa refrigeran (Q_{in}) sebesar 125,48 kJ/kg, (2) kalor yang di lepas kondensor persatuan massa refrigeran (Q_{out}) sebesar 162,44 kJ/kg, (3) kerja kompresor persatuan massa refrigeran (W_{in}) sebesar 36,96 kJ/kg, (4) COP_{aktual} mesin berbasis siklus kompresi uap sebesar 7,79, (5) suhu kerja evap (T_{evap}) sebesar 18,6 °C, (6) suhu kerja kondensor (T_{kond}) sebesar 56,5 °C.

Kata kunci : mesin pengering, sikles kompresi uap, sistem aliran udara tertutup, pelet pakan kelinci.

ABSTRACT

Vapor compression cycle based drying machine with closed airflow systemis used to replace conventional drying method using solar heat in the production process of rabbit feed pellets. The aims of this study were (a) to make a rabbit feedpellet drying machine that is safe, practical, efficient, environmentally friendly andcan be used at any time, (b) to find out the fastest drying time for rabbit feed pelletsproduced by a rabbit feed pellet drying machine which is carried out with a flow system. closed air, (c) knowing the characteristics of the rabbit feed pellet drying machine including: air condition in the rabbit feed pellet drying chamber ($T_{A, db}$. $T_{A, wb}$, $T_{B, db}$, T_{evap}, T_{kond}, $T_{D, db}$, $T_{D, wb}$), working temperature and pressure (evaporatorand condenser). Vapor compression cycle engine calculation with P-h diagram includes (Q_{in}, Q_{out} , W_{in}, COP_{actual}).

The study was carried out experimentally with a steam compression cycle- based machine with a closed airflow system, with the size of the machine box: length 120 cm, width 120 cm, height 120 cm, diameter of drying cabinet: 120 cm, width 120 cm, height 240 cm. This dryer uses a vapor compression cycle engine with a power of 785 watt, with the addition of 2 fans for a total power of 90 watts.Variations in the study are using 2 fans and without using a fan in the drying cupboard. The dryer uses a closed air flow system with the main components: evaporator, condenser, compressor, capillary tube and filter dryer.

The dryer can work optimally. The fastest drying time is obtained by usingtwo fans for 120 minutes. From the research results in the 90 minute using two fansin the drying cabinet, the results were (1) the heat absorbed by the evaporator per unit mass of refrigerant (Q_{in}) was 125.48 kJ/kg, (2) the heat released by the condenser per unit mass refrigerant (Q_{out}) of 162.44 kJ/kg, (3) compressor work perunit mass of refrigerant (W_{in}) of 36.96 kJ/kg, (4) COP_{Actual} machine based on vaporcompression cycle of 7.79, (5) working temperature evap (T_{evap}) of 18.6 ℃, (6) working temperature of the condenser (T_{cond}) of 56.5 ℃.

Keywords: drying machine, steam compression cycles, closed airflow system,rabbit feed pellets.