ABSTRAK

Cuaca di Indonesia yang selalu berubah-ubah sehingga tidak dapat diprediksi membuat para produsen pelet mengalami kendala dalam proses pengeringan dengan metode penjemuran. Agar para produsen pelet terus memproduksi peletnya, diperlukan mesin pengering yang aman, praktis, ramah lingkungan dan higienis. Tujuan dari penelitian ini adalah (a) membuat dan merancang mesin pengering pelet dengan menggunakan siklus kompresi uap yang aman, praktis, ramah lingkungan dan higienis sekaligus dapat digunakan setiap saat baik siang maupun malam hari tanpa bergantung dengan musim. (b) mengetahui karakteristik dari mesin pengering pelet pakan kelinci menggunakan mesin berbasis siklus kompresi uap dengan 1 kipas dan tanpa kipas meliputi: perhitungan mesin siklus kompresi uap dengan diagram P-h R410a yaitu (Q_{in}, Q_{out}, W_{in}, COP_{actual}), kondisi udara di dalam ruangan pengering pelet (T_{Adb},T_{Awb},T_{Ddb},T_{Dwb}), besar massa air yang berhasil diuapkan ΔW, suhu kerja evaporator (T_{evap}) dan kondensor (T_{kond}). (c) Mengetahui lama waktu pengeringan yang dilakukan dengan mesin pengering pelet dengan siklus kompresi uap sistem udara tertutup.

Penelitian ini dilakukan secara eksperimen. Mesin pengering pelet pakan kelinci ini berdaya 780 watt, daya kipas 45 watt. Ukuran ruang mesin pengering pelet pakan kelinci memiliki ukuran p x l x t = 80 cm x 120 cm x 120 cm dan ukuran ruang pengering p x l x t = 120 cm x 120 cm x 180 cm. Variasi pada penelitian ini yaitu 1 kipas dan tanpa kipas di dalam ruang pengering. Mesin pengering pelet pakan kelinci ini menggunakan siklus berbasis kompresi uap yang terdiri dari beberapa komponen utama: evaporator, kompresor, kondensor, dan pipa kapiler. Sistem udara yang dipergunakan yaitu sistem aliran udara tertutup.

Mesin pengering pelet pakan kelinci menggunakan energi listrik siklus berbasis kompresi uap dengan sistem aliran udara tertutup yang telah dibuat dapat bekerja dengan baik, aman, praktis, ramah lingkungann . Waktu pengeringan pelet pakan kelinci yang diperlukan mesin pengering pelet pakan kelinci tercepat 1 kipas yaitu 120 menit. Karakteristik dari mesin pengering pelet pakan kelinci menggunakan siklus berbasis kompresi uap dengan sistem aliran udara tertutup 1 kipas: (1) kalor yang diserap evaporator persatuan massa refrigeran (Q_{in}) : 117,12 kJ/kg, (2) kalor yang dilepas kondensor persatuan massa refrigeran (Q_{out}) : 143,82 kJ/kg, (3) kerja kompresor persatuan massa refrigeran (W_{in}) : 26,7 kJ/kg, (4) COP_{aktual} mesin pengering sebesar 9,77 (5) kondisi udara pada suhu kerja evaporator rata-rata sebesar 18,13 ºC, dan suhu kerja kondensor rata-rata sebesar 59,2 ºC

Kata Kunci : Mesin pengering pelet pakan kelinci, siklus kompresi uap, sistem aliran udara tertutup

ABSTRACT

The weather in Indonesia is always changing so that it cannot be predicted, making pellet producers experience problems in the drying process using the drying method. In order for pellet producers to continue producing their pellets, a drying machine is needed that is safe, practical, environmentally friendly and hygienic. The objectives of this research are (a) to produce and design a pellet drying machine using a vapor compression cycle that is safe, practical, environmentally friendly and hygienic and can be used at any time of the day or night regardless of the season. . (b) determine the characteristics of the rabbit feed pellet drying machine using a steam compression cycle-based machine with 1 fan and no fan including: calculation of the steam compression cycle machine with the P-h R410a diagram namely (Q_{in}, Q_{out}, W_{in} , COP_{actual}), air condition in the pellet dryer room (T_{Adb}, T_{Awb}, T_{Ddb}, T_{Dwb}), the mass of water that has been evaporated ΔW, the operating temperature of the evaporator (T_{evap}) and condenser (T_{kond}). (c) Determine the length of drying time carried out with a pellet drying machine with a closed air system vapor compression cycle.

This research was conducted experimentally. This rabbit feed pellet dryer has a power of 780 watts, a fan power of 45 watts. The size of the room for the drying machine for rabbit feed pellets is p x l x t = 80 cm x 120 cm x 120 cm and the drying room is p x l x t = 120 cm x 120 cm x 180 cm. Variations in this study are 1 fan and no fan in the drying chamber. This rabbit feed pellet drying machine uses a vapor compression-based cycle which consists of several main components, namely the evaporator, compressor, condenser, and capillary tube. The air system used is a closed airflow system.

The rabbit feed pellet dryer uses steam compression-based cycle electrical energy with a closed airflow system that has been made to work well, is safe, practical, environmentally friendly. The drying time for rabbit feed pellets required by the fastest rabbit feed pellet drying machine is 1 fan, which is 120 minutes. Characteristics of a rabbit feed pellet drying machine using a vapor compression-based cycle with a closed airflow system with 1 fan: (1) heat absorbed by the evaporator per unit mass of refrigerant (Q_{in}): 117.12 kJ/kg, (2) heat released by the condenser per Refrigerant mass unit (Q_{out}): 143.82 kJ/kg, (3) Compressor work per refrigerant mass unit (W_{in}): 26.7 kJ/kg, (4) Actual drying machine COP_{actual} 9.77 (5) Air condition at temperature the average evaporator work is 18.13 ºC, and the average condenser working temperature is 59.2 ºC

Keywords: Rabbit feed pellet drying machine, vapor compression cycle, closed airflow system