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THERMAL ENERGY REPLACEMENT POTENTIAL in A SLAUGHTER PLANT from RUMEN PELLETS
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Abstract
In this work, steam generation was studied using natural gas or rumen as energy sources in a slaughter plant that sacrifices 7500 cattle per month, with consumption 0.5749 kg/s of saturated steam at 624 kPa. For a slaughtered cow, 10.5 kg of rumen can be obtained after being dried outdoors; for its final disposal, the slaughter plant bears the costs of USD 7.2 per ton of rumen. In the study, exergy and exergoeconomic performances were compared by generating steam with a natural gas boiler with the steam generation with a rumen boiler. From this, combustion analysis, energy efficiency, exergy destruction, exergy efficiency, exergy destruction costs, and generating 1 kg of steam from the two boilers were evaluated. The study results showed that the generation of steam with rumen is less efficient than with natural gas since it presents the exergy destruction of 1175.9 kW and exergy efficiency of 26.83%. While the generation of steam with rumen boiler was obtained, with exergy destruction of 1419.9 kW and exergy efficiency of 23.29%. Exergy destruction cost and the cost of generating 1 kg of steam using rumen were /h 7821 and 0.0073 /kg, respectively. Although the generation of steam with natural gas present the exergy destruction cost of 26285 /h and the cost of generating steam of 0.021 /kg, this indicators are higher using natural gas as a fuel that with rumen pellets. © 2020 ASME.

Index Keywords
Combustion, Cost benefit analysis, Energy efficiency, Exergy, Natural gas, Natural gasoline plants, Pelletizing, Steam; Combustion analysis, Exergoeconomic, Exergy destructions, Exergy efficiencies, Final disposals, Saturated steam, Slaughter plants, Steam generation; Boilers

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