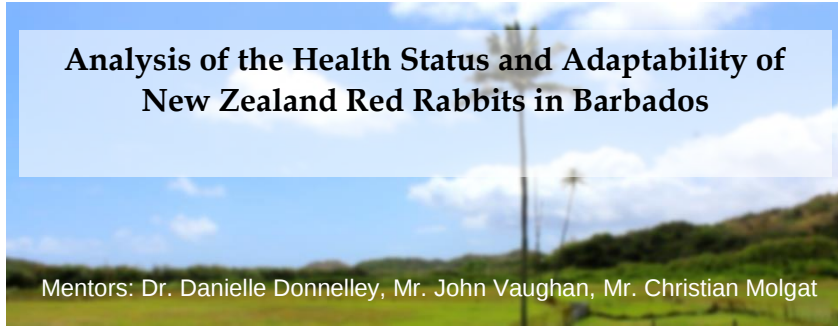


Introduction



Traditionally considered an alternative form of agriculture, commercial meat rabbit production is steadily gaining traction in the global livestock industry, and the island country of Barbados is no exception. Rabbit consumption worldwide has increased massively over the past 50 years largely due to increasingly health-conscious consumers who prefer a high-protein and low-fat white meat alternative. Though still in its infancy, the meat rabbit industry in Barbados shows considerable potential for expansion and development. In recent years however, the industry, which mostly consists of small backyard farm operations, has become stagnant due to the inbreeding of established commercial breeds. In collaboration with McGill University, the Greenland Livestock Research Institute (a division of the Ministry of Agriculture)



imported a line of New Zealand Red rabbits with the goal of diversifying the current genetic gene pool on the island, which forms the basis of this research project.

The project

The project's overall goals were to find ways to improve the commercial meat rabbit industry in Barbados, through the establishment of a crossbreeding project between three rabbit breeds: New Zealand White, Californian and New Zealand Red, an exploration of the health status of New Zealand Red rabbits, and a survey of alternative rabbit rearing systems. The long-term goal of the project would be to establish an exchange structure between local farmers and the Greenland Livestock Research Station, whereby Greenland would work to introduce New Zealand Red rabbits to local operations while farmers maintain records of breeding practices.

Materials and methods

A total of 35 rabbits were used during the entire experiment with a breakdown of 15 New Zealand Red does (NRd), 9 New Zealand Red bucks (NZb), 4 Californian does (Cd), 4 New Zealand White does (NWd). Two experimental groups, NRbxCd (n=2) and NRb xNWd (n=2) were compared to each other and to one control group featuring purebred NRs (n=2). In order to quantify the effects of crossbreeding, the following parameters were measured over the course of the experiment: litter size, kit survival rate, rate of weight gain and mothering ability.

Meanwhile, the health of the NR rabbits was monitored and inspected by taking weekly weights and observations to assess the adaptability of the rabbits to the Barbadian climate. Dissections of two NR does were performed and the weights of their internal organs and carcasses were measured and compared.

Finally, a free range system with a rearing capacity of 6-10 fully mature rabbits was built with locally available building materials including PVC pipes and chicken wire mesh. Outdoor and indoor rearing trials were completed using this prototype, followed by an analysis of the behavioural and physiological responses (such body temperature and level of physical activity) of the rabbits to group rearing in each context.

Results

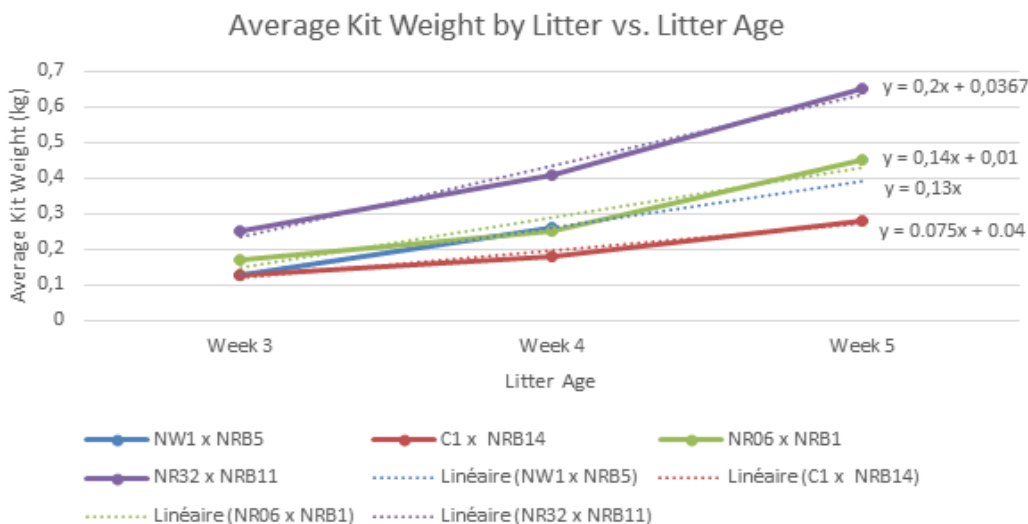
Four successful crosses (NWd1xNRb5, Cd1xNRb14, NRd06xNRb1, NRd32xNRb11) were realized throughout the summer leading to the births of a total of 24 kits (NWd1; 11, Cd1; 8, NRd06; 7, NRd32; 6). The data recorded at 5 weeks old regarding survival rate indicate that the NRxNR litters demonstrate a superior survival rate in comparison to the NWxNR cross, (62.5% and 71.43% vs. 50 %), but inferior to the CxNR crosses which displayed no mortalities. The estimated average rate of weight gain for kits also appeared to be higher for the NRxNR offspring, with an increase of 0.20 kg/kit per week and 0.4 kg/kit per week, as compared to the NWxNR and CxNR crosses which had gained 0.13 kg/kit per week and 0.075 kg/kit per week respectively.

The most frequently observed health issues among the rabbits were fatal heat stress and cardiac arrests, as well as pododermatitis (sore hocks) which affected 33.33% of the subjects. As a breed, the NR mortalities accounted for 72.7% of the deaths seen over the duration of the project, as well as 100% of the pododermatitis cases. On average, the subjects' weight at death were 4.73 kg for NR does and 3.95 kg for the NR bucks. Two autopsies done on NR does, who died respectively of cardiac arrest and heat shock, revealed abnormally high amounts of fat around the internal organs, the weight of which accounted for 42.6 % (NRd22) and 8.89 % (NRd23) of the weight of all internal organs.



Three group rearing trials, one outdoors and two indoors, for the free range system were completed with the three different breeds. Observations gathered during these tests exhibited mixed results due mainly to unanticipated health complications. However, some positive physiological and behavioural responses were still observed and suggest that the system could be

possibly used on a commercial and/or backyard basis. The pilot building trials and a cost analysis comparing different rearing systems demonstrated that the free range pen system potentially decreases the upfront capital needed to breed rabbits in comparison to the conventional cage system (\$25 BDD/rabbit vs. \$48 BDD/rabbit), while also lowering maintenance hours (0.8 h/rabbit vs 4 h/rabbit).



Discussion and Recommendations

Results obtained during the cross-breeding project demonstrated that the NR rabbits are very effective at producing heavy newborn kits; the average weight of the newborns in the NRd32xNRb11 litter was more than double that of the NWd1xNRb5 litter. Coupled with the rapid weight gain observed throughout, this ability to produce healthy growing newborns is an important asset to the New Zealand Red meat breed. Though the NWd1xNRb5 and NRd06xNRb1 showed slower weight gain, the offspring could potentially be more resilient in terms of climate adaptation than the NRxNR litter, thanks to their tropically adapted lineage. Overall, the smaller litter size of the NR does in comparison to their C and NW counterparts suggest that there is trade-off between survival rates and litter size as well as weight gain rates and litter size. Data compilation concerning weight gain, feed conversion ratios and health conditions should be continued in order to fully understand the characteristics of these newborn kits which could in turn act as breeders for future project phases.

The sporadic observations on the health status of the different breeds reared at the research station revealed that the causes of these health problems are generally the results of several factors. In fact, the surprising data concerning the amount of fat contained in the autopsied corpses suggest that it was not necessarily the absolute weight of the rabbits that caused heat stroke, cardiac arrest and pododermatitis. Rather, these issues may be the combined result of the breed's exceptionally high rate of weight gain and the animals' inability to exercise the weight into lean meat

when confined in small cages. While unfortunate, these deaths promoted overall fitness by keeping only the rabbits with the more resilient physiological breeding characteristics.

More research on the potential free range system needs to be conducted in order to improve the system and to assess the profitability on a commercial scale. Numerous challenges that have not been addressed by this research project, such as wild dog attacks, still remain a major limiting factor to the adoption of the system by farmers. Despite these concerns, the various data compiled on the low theoretical cost and working hours in comparison to the conventional cage system demonstrate that this system could eventually represent an interesting rearing option.

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