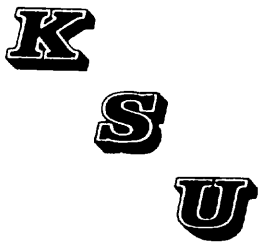

CELLULAR IMMUNE RESPONSES IN ARTIFICIALLY REARED PIGS[1]

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Summary

An experiment was conducted to determine the influence of artificial rearing on the cellular immune response of young pigs. Artificially reared pigs had lower cellular immune reactivity than sow-reared controls. These results indicate that artificial rearing may result in immunosuppression in young pigs.

Introduction

Weaning pigs at an early age can increase the productive potential of modern swine units. The economic advantages of early weaning arise from the ability to reduce the farrowing to breeding interval and thus, theorectically, produce more pigs per sow per year. Additionally, in sows that cannot support large litters to conventional weaning, at 3 to 5 wk of age, removing the "extra" pigs at farrowing and raising them artifically could result in more pigs reaching market age. Unfortunately, the earlier the pig is weaned the less likely it is to survive. Many factors may be responsible for the increased mortality and morbidity of early weaned pigs, but recent data indicate that a decreased immunological maturity, due to early or artificial rearing, may account for much of the losses in these rearing systems. Therefore, the objective of this experiment was to determine if the cellular immune response of artificially reared pigs differs from that of sow-reared controls.

Procedures

Twenty-four pigs were used in this study. All pigs received an injection of gentamycin (5 mg) and iron dextran within 12 hours after birth. Two days after farrowing, pigs were allotted by litter and weight to a sow-reared or artificially reared treatment group. Sow-reared pigs remained with the sow for 21 days. Artificially reared pigs were housed in individual cages (1 ft x 2 ft x 1 ft) in an environmentally controlled room with an average temperature of 90° F. Artificially reared pigs were fed a nonmedicated milk replacer for 14 days and then changed to a semi-solid, high-fat diet for the remainder of the 21-day trial.

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Total and differential white blood cell (leukocyte) numbers and body weights were determined weekly for 3 wk. Cellular immunity was evaluated by injecting the mitogen phytohemagglutinin into the flank of all pigs at wk 1 and 3 of the study. Flank skin-fold measurements were taken and the amount of swelling that developed was used as an indicator of cellular immune reactivity. On wk 2 of the trial, lymphocytes were isolated from periopheral blood of all pigs and stimulated with the mitogens phytohemagglutinin (PHA), concanavalin A (Con A), and pokeweed mitogen (PWM). Proliferation of the cultured lymphocytes, as indicated by incorporation of tritiated thymidine (^{3}H-TdR) into cellular DNA, was used as a second indicator of cellular immunity.

Results and Discussion

Artificially reared pigs displayed an increase ($P<.05$) in total white blood cell numbers. The increase in white blood cells was caused by an increase in ($P<.05$) neutrophils. Sow-reared pigs weighed (x, lb) more ($P<.05$) than artificially reared pigs at wk 1 and 3 (5.31 vs 4.47 and 12.59 vs 6.11, respectively). Phytohemagglutinin skin-test responses (x, Δ mm) were less in artificially reared pigs than in sow-reared pigs at wk 1 and 3 (4.1 vs 5.7 and 3.5 vs 7.6, respectively). Lymphocyte proliferative responses to all three mitogens were less ($P<.05$) in artificially reared pigs when compared to sow-reared pigs (Figure 1).

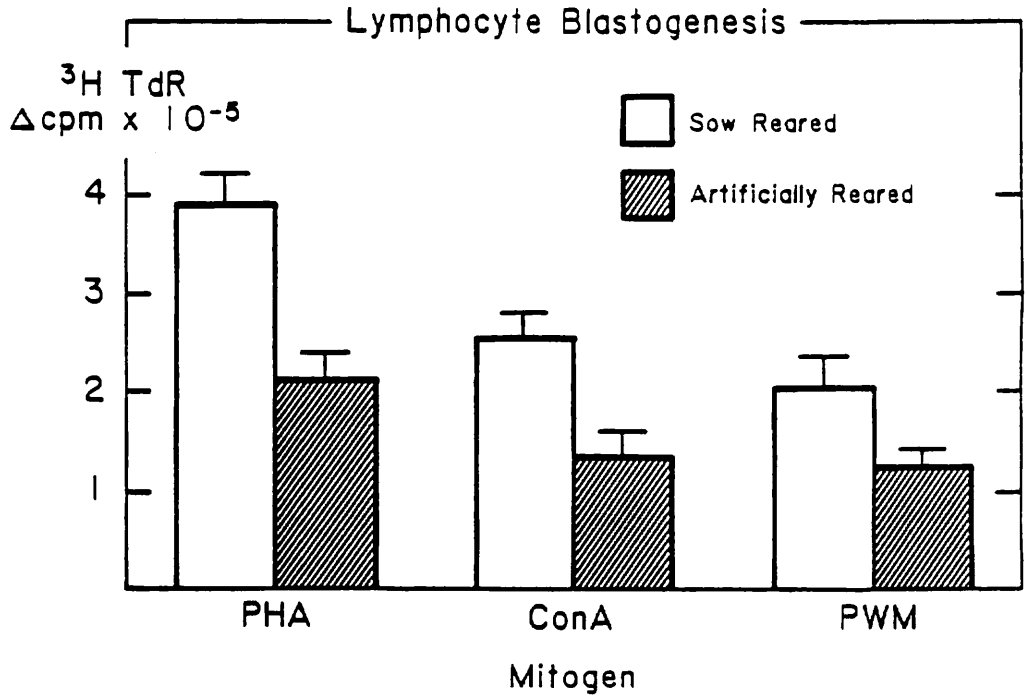

Figure 1. Proliferative responses of phytohemagglutinin (PHA), concanavalin A (Con A) and pokeweed mitogen (PWM) stimulated lymphocytes from sow-reared and artificially reared pigs.

These data suggest that artificially reared pigs may be immunologically compromised. We are conducting experiments to determine if various immunostimulating drugs can be used to enhance the cellular immune response of artificially reared pigs.