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EFFECT OF PREGNANCY ON DISEASE RESISTANCE

Rita C. Manak¹

Summary

During pregnancy, the immune response of cattle has an altered potential to overcome infection than during an open period. Several mechanisms seem to control this immune response, and they are being currently researched.

Introduction

During pregnancy, the dam's ability to respond to bacteria and viruses and to resist infection (its immune system) is altered somewhat to protect the developing fetus. While this system must continue to protect against infection, it must be modulated to avoid rejecting the fetus as if it were a growing foreign organ transplant. A disruption of this balance has impact on dam and fetal health as well as on embryo survival. Factors responsible for this interaction are not clearly understood. The purpose of these studies was (1) to assess the ability of the dam to respond to infectious-like agents as pregnancy progresses and (2) to determine if hormones that change in serum concentration during pregnancy affect this response.

Methods

We obtained lymphocytes (the cells mediating the immune response) from blood samples of six heifers at monthly intervals throughout the course of gestation. At the same sampling times, blood samples were also obtained from six ovariectomized (ovex) heifers as control for seasonal effects. All heifers were mixed breeds and were born the fall of 1978. The intact heifers were synchronized and bred June 23 to 25, 1980. The control heifers were ovariectomized in April 1980.

The lymphocytes were assayed for their ability to respond to two different immune stimulants: Concanavalin A (Con A) and Pokeweed Mitogen (PWM). In some studies, the response to these agents was determined in the presence and absence (controls) of physiological concentrations of estrogen, estrone, and progesterone.

Results

Table 1 summarizes the immune responsiveness of lymphocytes from pregnant heifers as a function of gestational stage, compared to responsiveness of control lymphocytes from ovex heifers. Figure 1 demonstrates the inhibiting effect of serum factors associated with

pregnancy on immune responsiveness of lymphocytes obtained from pregnant heifers. Together, these data suggest that during pregnancy, the potential of the immune response to recognize and overcome infection is heightened. However, superimposed on that situation is the existence of soluble substances in the serum of pregnant animals, which can further regulate responsiveness. Thus, the immune response of pregnant animals appears to be under the control of several mechanisms.

To assess the role of soluble steroid hormones, which increase in the serum during pregnancy, lymphocytes from 200-day pregnant and ovex heifers were assayed in the presence of estrone, estrogen, and progesterone. Figure 2

shows that progesterone, estrone, and to a lesser extent, estrogen, are indeed capable of depressing lymphocyte responsiveness. Further work is in progress to define these regulatory mechanisms and its effects on the health status of the dam and her fetus.

Table 1.—Stage of pregnancy on lymphocyte responsiveness

| Stage of gestation | Response of pregnant heifers Response of ovex heifers (%) | X 100 |
|--------------------|---|-------|
| Prebreeding .. | 80 | |
| 1st Trimester .. | 130 | |
| 2nd Trimester .. | 160 | |
| 3rd Trimester .. | 190 | |

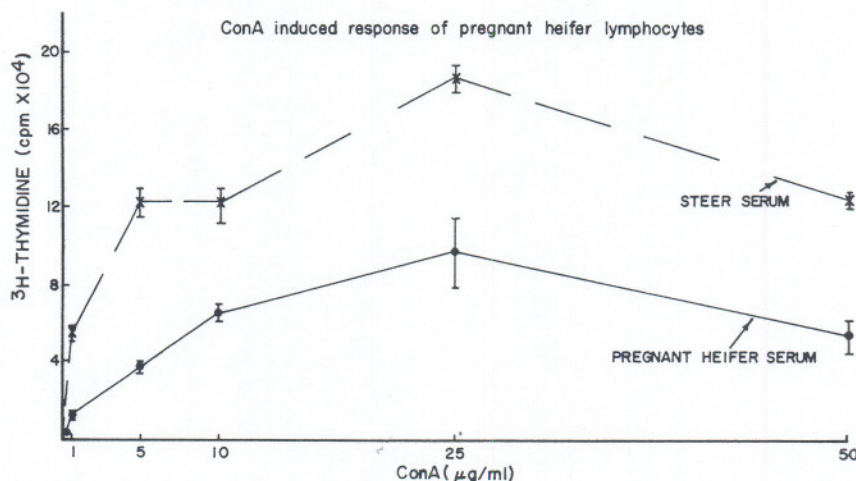


Figure 1.

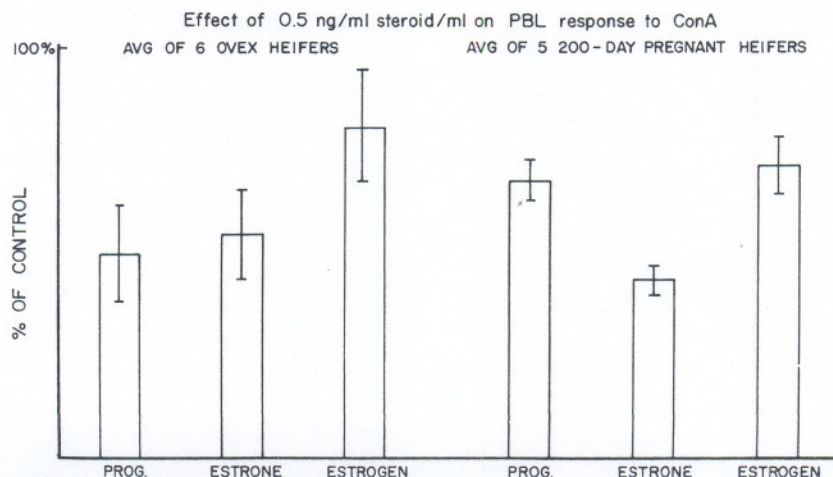


Figure 2.

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