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MAMMARY SECRETION OF IgG IN SOWS

By

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MARTINSSON, KJELL: *Mammary secretion of IgG in sows*. Acta vet. scand. 1972, 13, 191—196. — The IgG-concentration was determined in serum of 3 pregnant sows before and after partus and in colostrum of 7 sows 0—6 days post partum. The IgG-concentration decreased in serum before partus and increased after partus. The lowest value (1.5 g/100 ml) was observed at partus. The results indicate that IgG is transmitted from serum to colostrum.

The concentration of IgG in colostrum was found to be 2.1—10.4 g/100 ml at partus. The concentration decreased very fast during the first day post partum. During 3—6 days post partum the IgG concentration was rather constant (0.3—0.5 g/100 ml). The importance of the results for the passive immunization of piglets is discussed.

immunoglobulins; swine; mammary secretion.

The importance of colostrum immunoglobulins of mammals for the transfer of immunity from the mother to her descendants has been claimed by many authors (*Booman et al.* 1958, *Greenbaum & Miller* 1960, *Dixon et al.* 1961, *Pierce & Feinstein* 1965). There are also much evidence that the colostrum immunoglobulins are transmittent from serum to colostrum and not synthesized in the mammary glands (*Askonas et al.* 1954, *Dixon et al.*, *Feldman* 1961).

The colostrum represents the only source of antibody transfer from mother to offspring in the foal, lamb, calf and pig. In newborn piglets very small levels of immunoglobulin (IgG) can be detected with sensitive techniques (*Sterzl et al.* 1960, *Martinsson* 1970). Studies by *Binns* (1967) indicate that the low levels of

immunoglobulins observed in pre-suckled piglets are produced by the foetus.

In colostrum of sows there is a dramatic fall during the first 24 hrs. post partum of both the total protein and the immunoglobulins (*Morgan & Lecce 1964, Schone 1965, Bourne 1969*).

In cows decreased levels of serum gammaglobulins are observed ante partum depending on the secretion into colostrum (*Dixon et al., Pierce 1961*). Post partum the levels were found to increase probably depending on cessation of the gammaglobulin transfer to colostrum.

The object of this investigation was to study the serum IgG levels ante- and post partum and the changes in the IgG content of colostrum in the immediate post-partum period.

MATERIAL AND METHODS.

Animals. Seven sows, 1.5—3 years old of Swedish landrace were used. Blood samples were taken regularly ante- and post partum for IgG determinations from 3 sows. Pooled samples of colostrum were taken daily from the functional teats after delivery. The first samples were taken before the piglets had suckled. Colostrum samples were easily obtained during the first day post partum, but later on they were collected after injection of 5 i.u. of oxytocin. Blood serum was stored at -20°C . Colostrum samples were defatted by centrifugation ($3000 \times g$ for 10 min.) and stored at -20°C .

IgG-determinations. Serum and colostral IgG were determined by the single radial diffusion test (*Mancini et al. 1965*). Mono-specific anti-IgG was prepared as described by *Martinsson (1970)*.

RESULTS

In 2 of 3 sows examined the serum IgG levels were found to decrease from about 2.5 g/100 ml 14 days before partus to a minimum level of about 1.5 g/100 ml at partus. Post partum the IgG levels increased during the first few days in all 3 sows to about 2.0 g/100 ml (Fig. 1).

In Fig. 2 the IgG levels of colostrum from 7 sows are given. The levels at partus ranged from 2.1 to 10.4 g/100 ml. A dramatic fall was observed during the first day post partum, and between the 3rd and 6th day after partus the IgG-content was rather constant at a level of about 0.3—0.5 g/100 ml.

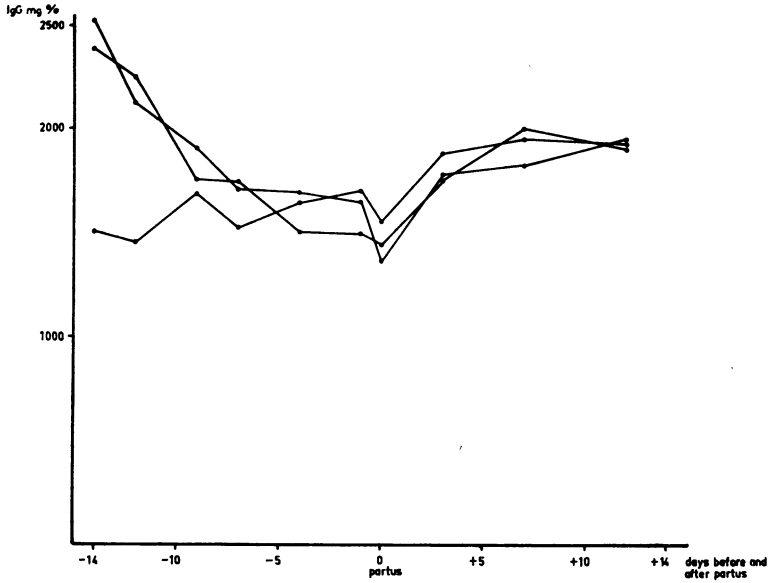


Figure 1. The serum concentration of IgG in 3 sows before and after partus.

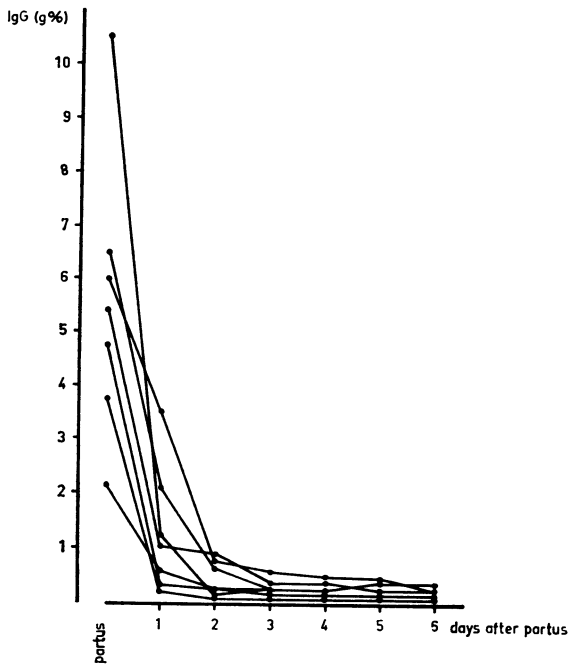


Figure 2. The IgG concentration of colostrum in 7 sows after partus.

DISCUSSION

In these investigations the minimum levels of IgG in serum of sows were observed at partus as were also shown in cows by *Pierce* (1961) and *Dixon et al.* (1961). The changes of the IgG levels before partus may be due to a transmission of IgG to colostrum which domineers over the active production in serum. This theory is further supported by the finding that labelled immunoglobulins pass unchanged from maternal serum to colostrum (*Larsson & Gillespie* 1957). After delivery this transmission ceases and consequently the serum IgG levels will increase.

The results obtained support the theories that serum IgG is transferred to colostrum also in sows judging from the decreasing levels in serum ante partum. Of the 3 sows examined only 2 showed this pattern. In the third sow the decrease is not pronounced during the ante-partum period of 2 weeks. This may be due to a previous outset of transmission to colostrum or an increased synthesis of IgG interfering with the transmission to colostrum.

The low serum IgG levels observed at partus are probably not of significance for the infections which often appear at this time in sows. Thus in man IgG levels of about 0.2 g/100 ml were sufficient for the protection against infections in cases of agammaglobulinaemia (cit. *Janeway et al.* 1967). Furthermore, colostrum-deprived piglets raised in a non-sterile environment could be protected by supplementation of immunoglobulin giving serum IgG levels of about 0.35 g/100 ml (*Martinsson* 1970).

The IgG content of colostrum varied very much at partus (range 2.1—10.4 g/100 ml). It may indicate that piglets from sows with a low IgG level of colostrum at partus are likely to have immunological disadvantages over piglets born of sows with a high IgG level. This may, in part, account for the hypogammaglobulinaemia found by *Breitling* (1965) in 17 % of litters examined. In such litters almost all piglets had a hypogammaglobulinaemia and the piglets were also found to have an incidence of infections twice that of normal ones.

In 7 sows examined no age differences of the colostrum IgG levels at partus were apparent, as was also found by *Bourne* (1969). The dramatic fall post partum in the concentration of IgG also seemed to be unrelated to the initial level (Fig. 2).

One—2 days post partum the IgG levels in colostrum were rather constant at a level of about 0.3—0.5 g/100 ml. This in-

icates that ingestion of colostrum immediately after birth is of greatest importance to receive an adequate passive immunity. It should also be borne in mind that the ability of the piglets to absorb antibodies greatly decreases during the first day of life.

From this study it may also be concluded that piglets born early in the farrowing process are likely to have immunological advantages over their littermates born later. Furthermore piglets born late have greater competition for teats which may also influence on the supply of colostrum and thus on the passive immunity.

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SAMMANFATTNING

Sekretionen av IgG till kolostrum hos suggor.

IgG-halten har bestämts i serum hos 3 dräktiga suggor före och efter partus samt i kolostrum 0—6 dagar efter partus hos 7 suggor. IgG-halten visades sjunka i serum före partus, för att efter partus åter öka. Vid partus var IgG-halten lägst (1,5 g/100 ml). Resultaten antyder att IgG transmitteras från serum till kolostrum före partus. Halten IgG i kolostrum varierade vid partus mellan 2 och 10,4 g/100 ml. Halten sjönk mycket snabbt under första dygnet efter partus. Under 3—6 dygnet efter partus var IgG-halten relativt konstant (0,3—0,5 g/100 ml). Resultatens betydelse för den passiva immuniseringen av späddgrisar diskuteras.

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