Immunity

How does lactogenic immunity develop?

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There is a lot of different information on colostrum immunity but not much on lactogenic immunity. We need to consider two broad categories of immune reaction to infection: humoral immunity, in which a major component is antibodies in the blood, and cell-mediated immunity, which need not involve antibodies.

Although they can occur independently, they usually both occur at the same time with greatly enhanced benefit. Cell-mediated immunity is initiated by lymphocytes originating from the thymus gland (T lymphocytes), whereas humoral immunity involves lymphocytes that are derived originally from the bone marrow (B lymphocytes). Cell-mediated immunity also involves other types of cell, such as macrophages and natural killer cells.

Passively acquired immunity

So far we have been considering active immune reactions that result from stimulation of the pig's immune system by invading antigens, but immunity can be passive without the pig's immune system being stimulated. Passively acquired immunity, usually termed 'passive immunity', is acquired naturally by the newborn piglet through the ingestion of colostrum and milk or artificially by the injection of antiserum or oral dosing of colostrum substitutes.

Colostrum

Unlike human babies and puppies, no antibodies are transferred through the placenta from the sow to her piglets before birth. Normally, piglets are born in a vulnerable state without any humoral or mucosal associated antibodies and no acquired cell-mediated immunity. Fortunately, towards the end of gestation when the sow's mammary glands develop, the first secretion they produce, colostrum, is rich in antibodies representing the whole spectrum of the sow's own circulating antibodies. A first instinct of the newborn piglet is to find and suck a teat. Normally, a sow has voluntary control over milk let down, but during farrowing this control is weak. The piglets nuzzle the teat and surrounding gland and then suck the teat. This results in a rapid let-down of colostrum. In the first 12-24 hours of life the piglet's intestines are able to absorb whole antibodies before the enzymes in the intestines digest them. Consequently, within a short period after a good first suck, the piglet's blood contains the full spectrum of its dam's antibodies, often at about the same level as that of the sow.

Four points must be emphasised:

- Without maternal antibodies the piglet is highly susceptible to infection. It is essential for the piglet's survival that it drinks colostrum soon after birth before pathogenic micro-organisms have had time to multiply and invade. It is also essential that it ingest enough colostrum to provide adequate protection until it has actively produced its own humoral antibodies.
- The ability of the piglet's intestine to absorb colostral antibody is short-lived, but is shortened still further when the piglet has drunk. Thus, if a piglet that has had no colostrum, is to be cross-fostered onto another sow, or given substitute colostrum orally, it should be done in the first few hours of life and no other nutrients should be given in advance. The fostering sow must also still have colostrum available.
- Being passively acquired the amount of antibody in the bloodstream is finite and can be exhausted by exposure to excessive antigen. Put another way, there is a maximum amount of colostral antibody that a pig can absorb into its bloodstream. Overwhelming doses of bacteria will use it all up.
- The passively acquired colostral antibodies in the blood gradually waste away to about half the initial level by about 10-14 days, although they may persist at a reasonably protective level against most pathogenic antigens for 6-12 weeks. The time taken to decline to ineffective levels varies depending upon the amount of colostral antibody taken in by the piglet and on the type of infection or toxin against which the antibody acts. In some exceptional cases (for example against Mycoplasma hyopneumoniae, parvovirus and Leptospira bratislava) they may persist much longer, sometimes up to four and a half months.

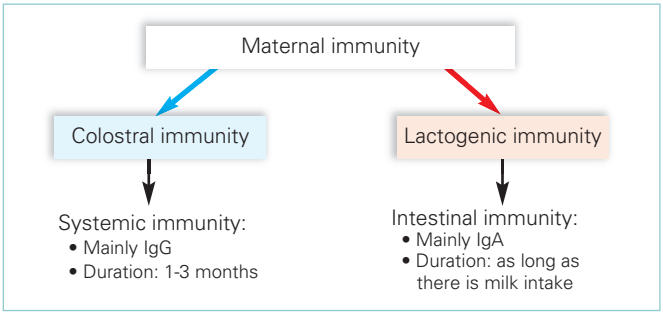

Fig. 1. Passive immunity transfer.

Table 1. Maternal antibodies.

		Antibodies (g/l)		
		IgA	IgM	IgG
Sow	Colostrum	10	3	50
	Milk	5	0.6	0.2

Milk

Mucosally-associated antibodies are present as IgA and secretory IgA in colostrum but at low levels relative to the other types of antibody (IgG and IgM). However, the normal milk which follows colostrum contains sufficient secretory IgA to get absorbed in the surface mucus and protect the piglet's intestines provided the piglet sucks the sow every one to two hours. This is sometimes called lactogenic immunity.

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