organism to replicate will mean failure to stimulate a rise in the animal's resistance.

Examples of replicating -- ML vaccines are listed.

- MLV-IBR
- MLV-BVD
- MLV-PI3
- Strain 19-Brucellosis

Non-Replicating -- ML Vaccines. Even though these vaccines are **live**, they do not and will not replicate in the body. Because of this, the animal will require at least two doses of the vaccine to stimulate adequate levels of resistance. The first dose will usually only "trigger" the memory mechanism in the body; a second dose, no sooner than 21 days, will stimulate the production of high levels of resistance.

How long the resistance remains high depends upon the animal's ability to respond and the quality and quantity of the vaccine. Most non-replicating -- ML vaccines require at least one booster each year to maintain the high resistance level in the animal.

Examples of non-replicating -- ML vaccines are listed.

- Chemically altered IBR/PI3
- MLV-BRSV

Inactivated Non-Replicating Vaccines. These vaccines have been inactivated or "killed" during the manufacturing process; they can not replicate in the body. As with the non-replicating -- ML vaccines, the animal will require at least two doses of the inactivated non-replicating vaccine to stimulate adequate levels of resistance. The first dose will usually only "trigger" the memory mechanism in the body; a second dose, no sooner than 21 days, will stimulate the production of high levels of resistance.

How long the resistance remains high depends upon the animal's ability to respond and the quality and quantity of the vaccine. Most inactivated non-replicating vaccines will require at least one booster each year to maintain the high resistance level in the animal.

Examples of Inactivated Non-Replicating Vaccines include the following list.

- Killed virus vaccines
- Bacterins
  - Leptospira
  - Clostridia
  - Haemophilus somnus
  - Vibriosis
  - Pinkeye

Intra-Nasal Vaccines. These vaccines will usually replicate only in surface cells of the upper respiratory tract. They stimulate localized resistance for the areas in which they replicate. In general, these types of vaccines provide a quick, short-lived rise in resistance, and will trigger the "memory" cells in the body. Because of the triggering mechanism, boostering the animal at a later date with a replicating or a non-replicating vaccine containing the same organisms will stimulate a high level of resistance for a longer period.

Examples of intra-nasal vaccines are included below.

- Nasal IBR
- Nasal PI3

How an animal responds to a particular vaccine is greatly dependent upon the amount of maternal antibodies remaining in the calf at the time of vaccination. Before a maternal antibody can interfere with a vaccine, the antibody must be specific against that particular disease (i.e., Anti-IBR antibodies, Anti-BVD antibodies, Anti-H. somnus antibodies).

The animal's response to vaccines relative to the absence or presence of maternal antibodies must be understood to properly select a vaccine form.

Calves are born with very limited resistance against infectious diseases. The calves receive temporary resistance by a transfer of antibodies from the cow to the calf in the colostrum or first milk. These antibodies are referred to as **maternal antibodies** (Figure 3).

The resistance conveyed from the cow to the calf can be described as two types: non-specific resistance, which acts against low-level infection in general; and specific resistance, which acts against particular infectious agents. Regardless of the type, the newborn calf's resistance to disease challenge is raised **only** after receiving the maternal antibodies found in the colostrum milk.

Since the maternal antibodies contained in colostrum are readily absorbed by the newborn only