

embryos with the heat-shock protein, and then implanting the treated embryo into heat-shocked cows during the summer months," he says.

Monty says that researchers prefer using fresh embryos when possible but acknowledged that St. John's donation would come in very helpful because of the time and expense of collecting live embryos.

One problem with St. John's embryos is that before researchers can use them, they must first determine whether or not they are viable, Monty says. (See next story.) Until this issue is resolved, or until a significant infusion of financial assistance is provided to obtain living embryos, the research is stalled, he adds.

In the meantime, Guerriero is working on finding a lucrative source for HSP70 so that they can harvest large amounts to use in the course of their research.

"At this point it appears that bovine skeletal muscles contain the highest levels of the protein," he says. "Now we

just have to find a way to purify the protein."

This aspect of the project is being handled by graduate student Jesus Gutierrez, who has developed an assay, or test, that quantifies how much HSP70 exists in various tissues. By using this test researchers can monitor protein levels at any given time and under different conditions of stress.

As collecting HSP70 is also a difficult and time-consuming affair, Guerriero says that at some point in the future they hope to be able to remove the specific gene for the protein and place it into bacteria where it can be then produced and more easily isolated.

Potential applications of the knowledge gained through the study of heat shock proteins extends far beyond the enhancement of summer fertility rates in cattle, Guerriero says. Possible medical uses for humans, such as the treatment of cardiac and liver disease, as well as arthritis, could save many lives and relieve considerable suffering.

"It's very exciting stuff to think about," Guerriero says.

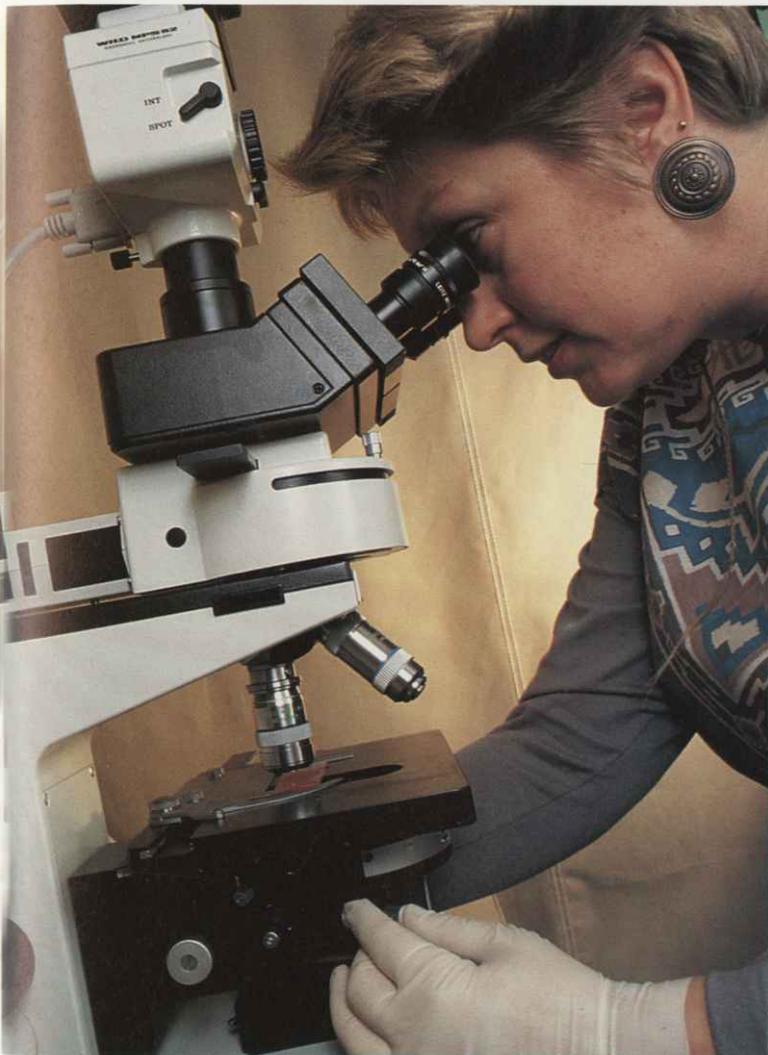
## Search for Usable Embryos Proves Elusive

*By Rebecca Cook*

ALTHOUGH VERNON ST. JOHN'S DONATION OF OVER 900 frozen cow embryos to Dr. Roy Ax's study was a potential windfall in terms of time and money, there remains the problem of determining viability of the embryos before the real work of the research can get underway.

"Some of these embryos are up to 10 years old," says Janice Somoza, the lab technician responsible for performing culture and embryo work for Ax's study. "We have no idea of the conditions under which these embryos were stored during that time, so we first have to satisfy the question of whether or not they are even still viable."

To accomplish this, the frozen embryos must first be "washed" in order to remove the chemical dimethyl sulfoxide (DMSO), which acts as a kind of preservative that allows the embryos to be stored for indefinite periods of time, Somoza says. To completely leech the DMSO from the embryos requires that they be "washed" a total of 10 times, for 10 minutes each. With each washing the microscopic embryo



Lab technician Janice Somoza is screening a gift of 900 frozen cow embryos, from Laveen rancher Vernon St. John, to see if any are viable. Ken Matesich photo

must be fished from one solution and placed in another, a task requiring Herculean patience and a good sense of humor.

"It's a good thing I love my work," Somoza laughs.

During the very last washing, HSP70 is added to the embryo. They are then placed in a culture of fetal calf serum and sucrose and allowed to incubate for the next 24 to 48 hours, where they are checked at 8-hour intervals to assess growth and development, Somoza says.

If the embryo is viable, it will show signs of "hatching," the microscopic observation of embryonic cellular reproduction and growth.

Before the embryo is either placed into a heat-stressed cow or stored again for use at a later time, Somoza says that fluorescent work is conducted on the embryo to try and determine precisely where the HSP70 has gone in the embryo. If researchers know where HSP70 manifests in the embryo, it is hoped that they will better understand how and why it works

to protect the development of the embryo, Somoza says.

She added that trials conducted on 2 embryos this summer, one with HSP70 added and the other without, indicate that the protein may well have a positive effect on embryonic development under conditions of heat stress.

The problem is that 2 embryos do not create impressive statistical validation for the research and, as the project goes up for grant funding, this is exactly what is needed, Somoza says.

"I need a trial run of at least 12 (embryos) in order to get a good statistical basis to put on the proposal for additional funding," she says.

The bad news is that, so far, Somoza has tested 30 of the 900-plus donated embryos and found that none of them were viable. But she remains philosophical:

"Oh, well," she sighs, "We have to have all these failures before we finally have the success."

