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## Boosting uterine blood flow improves litter size, health

Work is underway to develop an animal-specific formula that will increase production of immune cells, raise the level of blood vessel formation to fetuses and thereby achieve more live births

BY  
MIKE MULHERN

Research shows that improving uterine blood supply using a proprietary product developed for humans leads to larger, healthier litters. With that in mind, University of Guelph researcher Chandra Tayade is studying the effects of a new animal-specific formula on the development of litters. He is also doing a follow-up study to see how improving uterine blood supply during gestation affects the long-term health of the litter.

Tayade, an assistant professor in the biomedical sciences department at the University of Guelph, knew that trials to show selective breeding for genes that promote large uteruses and high placental efficiency have had limited success, so he set out to find what was defining the uterine interactions between a sow and her fetuses.

“Pregnancy is a dynamic state,” he says, “so even if you have some idea about the systemic circulation, you will not have any idea about the uterus during pregnancy.”

LEFT:  
Chandra Tayade

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What Tayade found was that immune cells in a sow's uterine lining regulate and contribute to good vasculature development at sites containing healthy fetuses, but abruptly stop gene transcription related to new blood vessel formation at the sites of fetal arrest.

He also found elevated levels of pro-inflammatory cytokines at those fetal-arrest sites. His solution was to find a product to boost production of immune cells to raise the level of blood vessel formation to fetuses and thereby achieve more live births.

With financial assistance from Ontario Pork and support of the pharmaceutical company which had developed a compound for use in humans, Tayade conducted trials on sows at the pathogen-free Arkel Swine Research Centre at the University of Guelph.

On insemination day, 20 sows received the proprietary treatment via intrauterine catheter infusion. Twenty control animals received a placebo. On gestation days 20 and 50, uterine tissue samples from



healthy and arresting litter mate attachment sites were taken. "We then tested these samples for gene expression related to factors that promote blood vessel formation," Tayade says, adding that the tests showed positive benefit for the litters of treated sows. "We not only increased litter size but also reduced the number of runts in treated animals, compared with the controls."

The problem with the human-based product, Tayade says, was cost. The new animal-specific product should be cost-effective for farmers to use. He points out that farmers will be able to treat the sows themselves before insemination, so they will not face additional costs stemming from animal-tech or veterinary support.

Tests are being completed using the animal-specific product, and the follow-up study of the litters is just beginning.

"Now my research is focused on the piglets that are born from these treated sows," he says, in order to prove the health benefits to the offspring. "We want to see whether the piglets born to treated sows have better body composition or feed conversion efficiency."

Tayade says the follow-up research, supported by a grant from the Natural Sciences and Engineering Research Council of Canada (NSERC), will take about six months. ■

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