Sheep success.
New blood helped an isolated bighorn population recover from inbreeding.

Credit: John T. Hogg

Bighorns Back in Business

By Katherine Unger
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For a population of animals spiraling towards extinction, things get bad before they get worse. Small numbers means fewer mate choices, more inbreeding, and less-healthy offspring. Scientists have "genetically rescued" such populations in captivity by introducing outsiders to freshen up the gene pool. Now, researchers report the first detailed evidence of a successful application of this strategy in the wild. The beneficiaries: a historically isolated flock of bighorn sheep in Montana.

The western United States was once swathed in herds of bighorns. But by 1922, domestic sheep diseases, hunting, and habitat loss had eliminated all sheep from places such as the National Bison Range (NBR) in northwestern Montana. In that year, wildlife managers hoping to nurse the NBR's bighorn population back to health transplanted 12 sheep from Banff National Park in Alberta, Canada. The herd waxed and waned in isolation until 1985, when scientists introduced new blood in the form of 5 rams from other herds in Montana and Wyoming. Over the next decade, 10 more sheep were introduced.

Conservation biologist John Hogg of the Montana Conservation Science Institute in Missoula and colleagues set out to evaluate the strategy's success. Hogg had studied the NBR bighorns for more than 20 years. Armed with the pedigree of every lamb born since 1979, his team used genetic paternity tests and field observations of courtships and births to assess how well the bighorns reproduced. Their findings were dramatic: The most outbred rams--descendants of introduced sheep--fathered 2.6 times as many healthy lambs as did the most inbred rams, and the most outbred ewes gave birth to 2.2 times as many healthy lambs as their inbred counterparts did. Outbred females also produced lambs nearly a kilogram heavier than did inbred moms. "I was surprised at the magnitude of the effect," Hogg says.

The findings may influence the way wildlife managers look after small populations, says Hogg, whose team reported its findings online 28 February in *Proceedings of the Royal Society: B*. Managers often like to keep animals away from other populations to minimize

the spread of disease, he says, but the study shows "it makes sense to manage with both disease and genetics in mind."

"I think it's a very impressive study, largely because they have such detailed information," says population geneticist David Tallmon of the University of Alaska Southeast in Juneau. Conservation and evolutionary geneticist Philip Hedrick, agrees, but he isn't convinced the study is a true test of genetic rescue. Fifteen new sheep were introduced into a population that started out with only 12, he notes. "It's more like restarting with a new gene pool."

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