LIVESTOCK PRODUCTION

USING ANTIBODIES TO INCREASE YIELDS

LONDON—Agricultural and Food Research Council (AFRC) researchers are evolving two novel strategies for increasing milk yield and carcass weight in cows and other livestock. Exploiting the animals' own immune systems, the techniques may offer more convenient and acceptable alternatives to using anabolic steroids (now banned from animal husbandry in the European Economic Community [EEC]) or bovine somatotropin (BST, subject of an 18-month EEC moratorium imposed in September by Agriculture Commissioner Raymond MacSharry). Both approaches hinge on introducing anti-idiotypic antibodies that remain in the bloodstream for long periods, thus obviating the need for the repeated injections necessary with BST.

Working at the Hannah Research Institute (Ayr, Scotland), David Flint and his colleagues have learned how to induce animals to make antibodies that mimic the structure and action of BST. By injecting BST into rabbits, they have generated anti-BST antibodies which, injected back into cows, provoke the formation of anti-idio-

typic antibodies resembling BST in shape (if not in detailed chemistry). These antibodies are specific to BST: They bind to its receptors, but not to those for other hormones such as insulin and prolactin. In a paper to appear shortly in the *Journal of Endocrinology*, Flint and his co-workers also demonstrate that both the mimics and BST itself promote growth when injected into rats deficient in their own growth hormone.

Meanwhile, at the AFRC Institute for Grassland and Animal Production (Hurley, Berks), Isabel Forsyth and colleagues have found that monoclonal antibodies directed against BST can enhance, rather than impair, its biological action. In one series of experiments, lactating sheep given growth hormone increased their milk yield. When given an identical dose of hormone complexed with monoclonal antibody, however, they produced nine percent more milk over the same treatment period. Presumably, the antibody promotes the action of BST by altering its binding to the BST tissue receptor.

The researchers next set out to

identify the epitope of growth hormone associated with the enhancement, and to raise antibodies against it. Such antibodies may derive from more than one B lymphocyte and thus not be strictly monoclonal, but may behave as such. Their presence in an animal's circulation should thus enhance the biological activity of its own hormone. Preliminary results indicate that this will be feasible. In sheep, Forsyth and co-workers have raised an antibody against an epitope of growth hormone, and given a partially purified version of it to another group of sheep. They found that the antibody combined with circulating, endogenous growth hormone and increased its bioactivity. Compared with untreated controls, the animals showed reduced fat synthesis.

The Hurley team believes that a strategy based on one or two injections of small amounts of hormone epitope, where both hormone and enhancing antibody are produced by the animal itself, offers practical and regulatory advantages over repeated injections of large quantities of exogenous hormone. —Bernard Dixon

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