

AGRICULTURE

EMBREX: THE EARLY BIRD IN POULTRY BIOTECH

RALEIGH, N.C.—The commercial poultry industry is worth a fortune. Individually, however, chickens are worth next to nothing. In fact, they are the very sort of high-volume, low-value products that biotechnologists habitually shun. So, while a number of bovine-oriented genetic engineering companies are seeking to improve the productivity of cash cows, the average chicken has hopped along under the sole influence of traditional (though effective) performance-improving technology.

A new company here is hoping to change all that.

Called Embrex (short for *embryo experimentation*), the 15-month-old start-up will focus on administering products into poultry eggs to improve disease resistance, hatchability, growth rate, feed conversion, egg or meat quality, and reproductive performance.

Central to Embrex's plan is a method, exclusively licensed from the U.S. Department of Agriculture, that allows the efficient administration of vaccines and other products *in ovo*. Embrex is also developing an automated, high-speed injection system to process 25,000–30,000 eggs per hour. With this proprietary technology in place, Embrex believes it will have cleared the major economic barriers to bringing biotechnology to the expanding poultry business.

Poultry sales topped \$17 billion in the U.S. alone last year at the consumer level and \$5 billion at the producer level. What's more, some time around the year 2000, poultry will probably replace beef as the most consumed protein item in the country. Up until now, conventional breeding, antibiotics, anticoccidials, improved nutrition, and optimized management practices have been successful in decreasing the age of chickens coming to market from over 100 days in the 1950s to about 47 days now. These techniques have even pecked away at the all-important feed-per-pound ratio, dropping it from almost 3.4:1 in the 1960s to just under 2:1 now. Turkey feed-efficiency has also improved—from almost 5:1 in the late 1950s to about 3:1 today. Impressive gains, but Embrex believes that the traditional methods have just about reached their limits, so it is up to biotech to carry the poultry flag forward.

According to president Alan G. Herosian, Embrex's first products will be an embryonically administered vaccine (probably against Marek's dis-

ease) and an embryonically administered peptide that stimulates the release of growth hormone. Although Herosian refuses to identify this hormone, he says that it will improve growth and hatchability by "making the metabolic process kick in earlier." Embrex's first products could hit the market by 1988; the company predicts that its total sales will climb to over \$40 million within five years, and that net income will reach around \$10 million. Herosian, who had been with SmithKline Animal Health Products for a decade before moving to Embrex, stresses that his new company will become a vaccine deliverer, not a vaccine producer. The firm will join forces with current vaccine makers to develop their vaccines for application into Embrex administration systems.

Embrex's second objective is to inject peptides into avian adults to improve their reproductive physiology. Here, however, the large number of birds involved could make develop-

ment difficult. Although the company will not address the huge broiler chicken market (4.5 billion birds annually in the U.S.), it hopes to tackle layers (270 million), breeders (30 million), and turkeys (170 million). Crucial here will be the development of a system to efficiently handle adult birds.

Embrex's third goal is to build a business around preserving poultry semen, the shelf-life of which is only about six hours at present.

Further in the future, Embrex intends to take advantage of a licensed avian virus gene transfer system to transform somatic cell lines in poultry. But chairman and founder Harold V. Smith stresses that these research activities won't really begin until product revenues begin to flow. "In the near term," he says, "Embrex's emphasis will be on the 'D' side of the R&D equation."

To transform somatic cells, the engineering vector must enter the egg-shell within a day after the egg is laid. To administer vaccines and hormones, however, the optimum time is 2½ weeks later: three days before hatching. This means that Embrex might have to breach each egg twice. Eventually, however, it hopes to design delayed-release systems so that just one early injection will do the trick.

Although numerous hurdles remain—regulatory and competitive, as well as developmental—the company has secured some heavyweight financial support. It is on the verge of completing a \$4 million round of venture financing, with the London-based Biotechnology Investments Ltd. as the lead investor. With eight employees now and plans for 25 by year-end, Embrex intends to move soon into its own facilities adjacent to the North Carolina State University (Raleigh), a recognized leader in poultry science.

According to Smith, "A unique technological vacuum exists in the poultry field right now" with most of the technology-based companies not understanding the complexities of the poultry business, and the integrated poultry companies not grasping the significance of new biological techniques. Embrex's advantage, he says, is its "total commitment to poultry alone."

Having overcome biotech's original *apprehension*, Embrex's poultry strategy could in a few years yield something to really crow about.

—Arthur Klausner

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**IMAGE
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A prototype single-punch egg-injection system.

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