

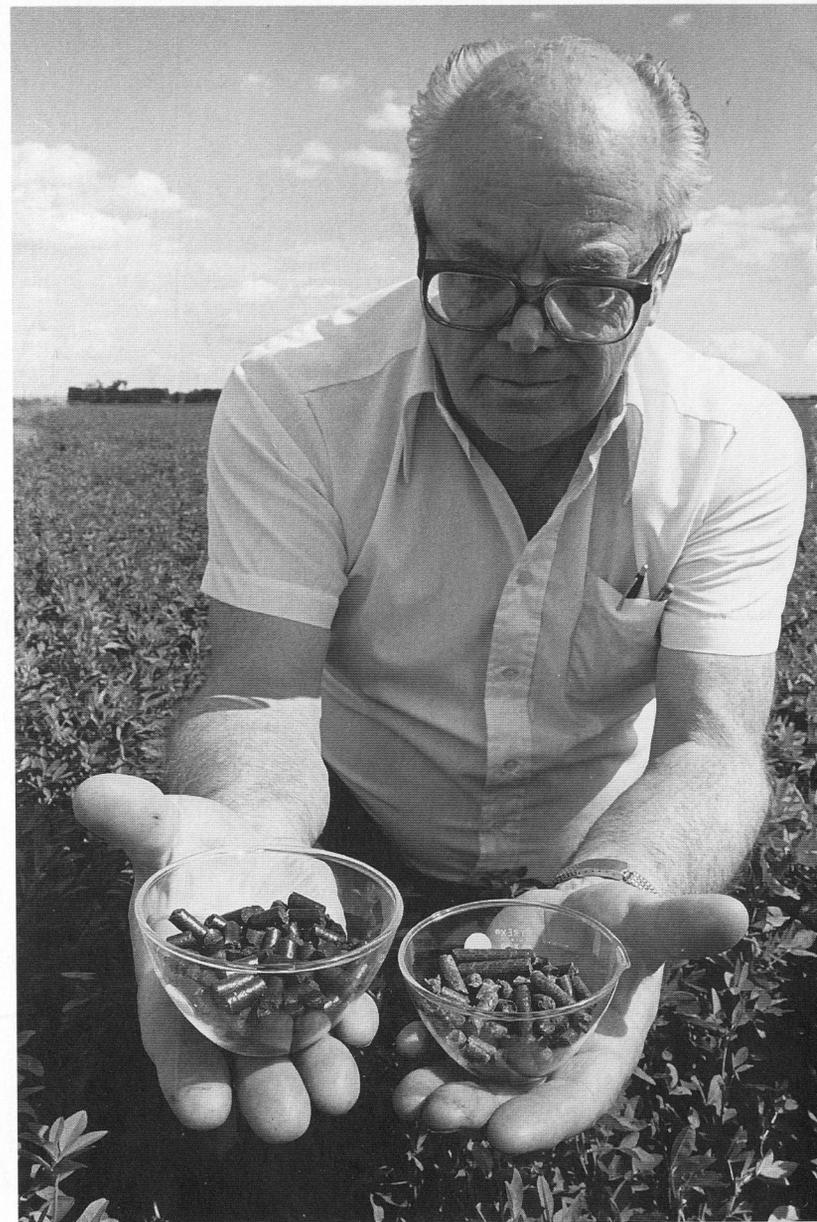
Alfalfa

Alfalfa research at the Western laboratory in the 1940's and early 1950's focused on ways to preserve the vitamin E and carotenoids (precursors of vitamin A) that were lost when alfalfa was dehydrated. After investigating hundreds of compounds, WRRC researchers found that an antioxidant called ethoxyquin was the most effective in preventing the oxidation and loss of alfalfa's vitamins.

Ethoxyquin's safety as a feed additive was demonstrated in cooperative research with industry and State experiment stations. As a result, it was cleared by the Food and Drug Administration in 1959. Just 3 years later, it was being used by 80 percent of the alfalfa dehydrating industry. As usage increased, industry and State researchers reported that ethoxyquin was also effective in preventing several diseases of meat animals and poultry. In 1961, FDA okayed use of the compound as a direct additive for spraying on feed.

A continuing problem with alfalfa, however, was that it contained so much fiber that it was generally limited to feeding cattle and sheep, who were able to digest it. It contained protein to spare, but attempts to separate the leaf protein for other feed uses had been unsatisfactory. A group of researchers in England had developed a product, but it had serious drawbacks, including a dark, greenish color, bitter flavor, insolubility, and poor digestibility. It was a WRRC scientist, seeking ways to modify dehydrated alfalfa for feeding poultry, who discovered that fresh alfalfa can be separated into several fractions. In one process, juice is pressed from fresh-ground alfalfa and heated to 85°C to form a curd of protein, high in xanthophyll, a natural yellow pigment that colors poultry skin and egg yolks. The protein-xanthophyll curd, which resembles cottage cheese, is then separated from the alfalfa solubles and dried to yield a high-protein (50-60 percent), high-xanthophyll product for the poultry industry. The high-fiber residue is a good ingredient for cattle feed. Named the Pro-Xan process, it was first used commercially by a converted dehydration plant in Colorado.

In an alternative process, a differential heat treatment of the alfalfa juice is used to separate a soluble white protein from the green protein fraction. The white protein can be purified to yield an edible product with the whipping properties of egg whites. The remaining green protein fraction can be used for poultry rations.



Chemist George O. Kohler shows samples of pelletized Pro-Xan (left), a poultry and swine feed high in protein and xanthophyll, and dehydrated alfalfa feed for cattle and sheep. Kohler headed the WRRC team that developed Pro-Xan.

Queen of Forages

Alfalfa is the only forage known to have been cultivated before recorded history. Several millennia later, it journeyed with the Persian legions from its homeland, probably Iran, to Greece. As the invaders gained footholds, they sowed alfalfa to feed their chariot horses and fatten their cattle. Persian soldiers ate it, too, boiling the tops for greens or pottage. In time, alfalfa spread from Greece to Rome and eventually throughout most of Europe.

Spaniards brought alfalfa to the Americas, planting it in Mexico and Peru, where arid, alkaline soils were similar to those of the plant's original habitat. Two centuries later, English colonists tried the crop in the inhospitable acid soils and humid climate of the Atlantic seaboard, where it had little success.

It was the California Gold Rush of 1849 that firmly established alfalfa in this country. Several easterners sailing around Cape Horn to the West stopped in Chile, where they obtained alfalfa seed. In California, many found that growing alfalfa paid better than panning for gold. The alfalfa boom was on.

Alfalfa grew rank in California, and its lush growth soon mantled many acres in the intermountain and Great Plains regions. As recently as 1900, however, only 1 percent of all U.S. alfalfa was grown east of the Mississippi. Since then, thanks in part to plant breeders with ARS and State experiment stations, alfalfa has become a national crop. The efforts of breeders were enhanced by the National Foundational Seed Project, which made seed of improved varieties available to seed growers. (Abridged from editorial in *Agricultural Research*, April 1971.)



Alfalfa's history

as a nutritious

forage dates back

thousands of

years to the

Middle East.



—*Medicago sativa* (alfalfa)