

ALBION'S PIONEERING ROLE IN AGRICULTURE

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Albion Laboratories' involvement in scientific farming is a result of applying research principles to practical applications. Albion has not tried to repeat what others have done. Instead, the scientists at Albion have taken what others have reported and built upon those data by forging new paths and developing new ways to accomplish the goal of more profitable, and more economical farming.

Albion was established in 1956 by Dr. Harvey Ashmead. From the very beginning, there were research projects initiated. Because research has to be paid for, Albion developed a sales program to support its research. The farmers and ranchers in what is called the intermountain area (Utah, Idaho, Wyoming, Colorado, Montana, and Nevada) had a large number of animals. When these animals became sick, the farmer was required to ask the veterinarian to take care of his animal. The veterinarian had control of the needed drugs, and so, even though the farmer would have been able to diagnose and treat the simple diseases himself, he could only obtain the needed drugs from the veterinarian. Albion introduced a program in which the drugs were provided directly to the farmer, thus removing the necessity of going to the veterinarian to obtain drugs for problems that the farmer was capable of correcting himself. Certainly, there were problems that required the services of a veterinarian, but for the simple medical problems, Albion was able to assist the animal producer by reducing his cost of production.

This approach to veterinary medicine was a very unique concept in the United States in the 1950s. At that point in time, no one else was doing it. The major drug manufacturers watched Albion's progress with great interest. As they saw of Albion's sales expand, they decided that this was a good marketing opportunity for them too. They then came into the intermountain area where the concept had been introduced and started selling the drugs directly to the larger farmers and ranchers who were Albion's customers. Albion realized right then that if it were to survive against the drug manufacturers, it had to change. And change it did!

One of Dr. Harvey Ashmead's degrees was in pharmacy. He is a registered pharmacist. Therefore, with Dr. Ashmead's guidance, Albion began making veterinary pharmaceuticals in competition with those major manufacturers from whom it had previously purchased. It was not very long before Albion became the largest manufacturer of veterinary pharmaceuticals west of the Mississippi River. Many of the formulations for veterinary drugs that resulted from Albion's research are still being used today in veterinary medicine by other companies. For example, there is an oxytetracycline-neomycin and vitamin A and D combination tablet for diarrhea in baby calves that was developed by Albion. Although Albion no longer manufactures the product, it is still an effective formulation and continues to be produced and marketed by many companies.

During that early manufacturing period, a corporate policy evolved in which the majority of the profits obtained from the sale of these pharmaceuticals were reinvested in research to develop new and better products.

One of these research avenues led into animal nutrition. Albion became involved in the blending of vitamin and mineral supplements for animals. Animal feeds generally needed to be fortified with vitamins and minerals. There was no guarantee of adequate nutrition from available feedstuffs

As Albion produced these vitamin and mineral premixes, which were very good products by the nutrition standards of the day, it was noticed that frequently the animals were ingesting the minerals in these supplements, but they were not subsequently absorbing or metabolizing them. What was initially being put in the animals' mouths could be found in the feces later on. That observation led to research to ascertain why the animals weren't absorbing these mineral salts from their feeds.

That single observation was a very significant turning point in the history of Albion Laboratories because it led to what Albion is today. Albion discovered that before the animal could absorb the minerals which were in inorganic salt forms, they had to be changed and modified. In other words, they had to be chelated or complexed. The animal would attempt to do this in its stomach and intestines. The problem was that these internal chemical modifications were very inefficient because there are numerous dietary interferences to the effective complexing of minerals in the gut.¹

After discovering this concept after conducting many experiments over a long period of time, the scientists at Albion concluded that if the animal required that its minerals be chelated before intestinal absorption, why not pre-chelate them outside the animals before feeding the minerals? While there were already some chelates that had been introduced to the animal feed industry, they were not particularly biologically available because these early chelates used synthetic ligands such as EDTA.² Rather than duplicating what was already unsuccessful, Albion proceeded to develop pre-chelated minerals that were biologically available by using amino acids as ligands.

Those first Albion amino acid chelates were not very sophisticated by today's standards. It is like comparing a Model "T" Ford to the cars of today. In the early 1900s, the Model "T" was the very best product that could be made efficiently. However, automotive technology has changed immensely by improving on past technology. The same is true with the amino acid chelates developed through the research done at Albion. When Dr. Ashmead and his research team commenced its pioneering research, no one knew how to make nutritionally functional chelates. Through trial and error, they discovered the basic requirements which were necessary for the manufacturing of bioavailable chelates. As they learned how to make nutritionally functional chelates, as proven by a multitude of animal tests, they obtained patents on those discoveries. (It should be noted that if Albion and its research team had not truly discovered something new, the company would not own the 52 patents in the area of chelation which it currently has.)

Even though these original amino acids were not very effective by today's standards, they did work. The animals absorbed more of the chelated minerals that were fed to them than before, and suddenly, the metabolism of those animals changed. The performance limits previously prescribed to them were discarded as new data were developed. Biologically available mineral nutrition suddenly equated to more efficient reproduction. Immune systems were improved. Growth rates were accelerated. Feed conversions were improved. Mortality was reduced. And the list went on.

These discoveries were published in journals and magazines. Lectures were also presented at scientific meetings, nutrition conferences, and veterinary meetings. The initial reaction of the majority of the scientific community to Albion's discoveries was skepticism. After all, Albion was rewriting animal nutrition, and people generally resist changes in their thinking. Furthermore, synthetic chelates had already been shown to be ineffective in improving animal nutrition and very few people comprehended the differences between the synthetic chelates and Albion's amino acid chelates. Today, that is no longer the case, and Albion is looked upon as the undisputed authority of this form of mineral nutrition throughout the world.

By 1970, Albion had generated enough animal data that it felt comfortable entering into the field of human nutrition. In one of the publications introducing the concept of amino acid chelated mineral nutrition for human nutrition, a non-Albion writer wrote, "This concern over trace minerals is not new among the scientific body. Several years ago, several scientists set out to do something about it. Three such men are: Dr. Harvey H. Ashmead, Ph.D., Dr. Phil Hinze, DVM, and Dr. Dane! Graff, Ph.D. [all of whom worked for Albion]. Fifteen years ago, these men started directing their efforts into this field and have come up with some startling discoveries. First, they set about to find out why inorganic (metallic) trace minerals were not as readily assimilated by the body as were the organic minerals. Their research carried them all the way from studying trace mineral levels in the soils and comparing this to the levels in foodstuffs grown in this soil to the transportation and evolvment of these minerals in actual living tissue. Several years ago, Ors. Ashmead, Hinze, and Graff began experimenting with these inorganic trace minerals (namely iron, zinc, copper, and cobalt). They found by 'chelating' or complexing these minerals with amino acids, they could increase the assimilation into the system sometimes as much as 300%."³

One of the studies this author referred to was published in *Feedstuffs* In 1969.⁴ Albion had completed a four year study on the mineral levels in crops grown in the Midwestern part of the United States. One thousand samples of the crops grown were taken each year and analyzed for mineral content by atomic absorption spectrophotometry. When all of the analytical data were analyzed, the results showed that in spite of the fertilization practices of the farmers, the mineral content of the crops was declining. Results are summarized in Table 1.

Mineral	Beginning Level	Ending Level	% Decline
Calcium	0.047%	0.025%	-41%
Phosphorus	0.26%	0.24%	-8%
Potassium	0.34%	0.245%	-28%
Sodium	0.022%	0.01%	-55%
Magnesium	0.128%	0.10%	-22%
Iron	21.20 ppm	15.70 ppm	-26%
Copper	2.56 ppm	.82 ppm	-68%
Zinc	22.01 ppm	19.90 ppm	-10%
Manganese	4.88 ppm	3.23 ppm	-34%

While doing research in animals and human beings, the scientists at Albion were also conducting studies in plant nutrition. They theorized that if animals and humans absorbed more minerals after they were chelated with amino acids, so would plants. After all, plants, animals, and man were all biological entities, and many of the biochemical aspects of mineral metabolism were common to all. The theory was proven, and four years after introducing amino acid chelates for human nutrition, Albion felt it had enough research in the area of agriculture and plant nutrition to commercially enter the field of agriculture with scientifically proven products. A large number of agricultural studies had been conducted throughout the 1960s. In 1970, Dr. Ashmead reported in the *Journal of Applied Nutrition*, "Corn germinated quicker and grew higher".⁵ Others also noted this pioneering work of Albion and were quick to point out its benefits. Cox wrote in *Organic Gardening and Farming*, "While chelators are not new, during recent years, some of the chemical companies have been aggressively marketing synthetic chelates. These pose the danger of being so strong as to dissolve too much of the stored nutrients in a short time, leaving little for future crops to draw on. One of the country's top authorities in the field of organic chelates is Dr. Harvey Ashmead of Albion Laboratories in Ogden, Utah. He has

tested over 200,000 animals to determine which chelates are absorbed by the animals fastest. Similar tests were conducted on plants.”⁶

Among those tests on plants were numerous radioactive isotope tests designed to ascertain the bioavailability of the amino acid chelates compared to other forms of chelates and non-chelated minerals. These studies were subsequently published in the Journal of Plant Nutrition and elsewhere.^{7,8,9,10} All of these studies demonstrated that greater mineral bioavailability resulted when amino acid chelates were used, compared to other sources of minerals, including certain other types of chelates. Some of these data are summarized in Table 2 and showed that amino acid chelates were able to be rapidly translocated in the area of need within the plant as well as being able to be absorbed in greater quantities.

Plant Part	Iron Amino Acid Chelate	Iron Sulfate	% Increase
Point of Application (POA)	227	68	234
POA 1cm	0.54	0.17	218*
Opposite Leaf	0.20	0.13	54*
4th Internode	8.70	0.60	1350*
4th Node	0.20	0.67	<70>
3rd Internode	0.37	0.70	<47>
3rd Node	0.40	0.20	100
2nd Internode	0.07	0.70	<90>
2nd Node	0.03	0.10	<70>
1st Internode	0.33	0.13	153
1st Node	0.17	0.13	31
Root	0.13	0.03	333*
Total	238.14	71.56	233*
Total (except POA)	11.14	3.56	213*

* Significant at pc 0.10

*^a Corrected counts per minute per mg of dry tissue

Because these isotope studies demonstrated that rapid mineral translocation occurred from the point of application of Albion’s amino acid chelate to the leaf, to the roots, to the stem, or to other leaves, Albion developed the concept of applying the minerals on the leaves rather than in the soil. More of the mineral is lost to the plant when it is put in the soil compared to a leaf application, but until amino acid chelates were developed, efficient uptake and transportation of most minerals from a leaf application was not possible.⁹ Albion was one of the pioneering companies to introduce and promote foliar fertilization. In the early 1970s, that was not a popular concept. Nevertheless, after Albion introduced the concept to agriculture, independent investigators from Utah State University determined that when the mineral was chelated to amino acids using the exclusive Albion manufacturing process, the amino acids that were bonded to the minerals would rapidly pull the minerals through the cuticle surface of the leaf into the plant tissues and significantly increase plant growth and production.¹¹ This is seen in Table 3 in which an experiment involving tomatoes was conducted. “The study was a completely randomized block design with four treatments and five replicates. Each plot was 10 meters by 1 meter.”¹²

Treatment (ml/ha) ^b	Number of Buds (Average)	Number of Fruits (Average)
0	28.2	19.8
464.28	30.5	20.3
535.71	31.5	21.5
607.14	33.2	27.0

^a Multimineral Amino Acid Chelate (1% Ca, 1% Mg, 0.5% Zn, 0.5% Cu)

^b Units are milliliters per hectare

“The number of buds increased progressively according to the rate of foliar application of Multimineral Amino Acid Chelate. The most dramatic increase occurred in the number of fruits obtained from the highest application of the multimineral. This is especially significant in that the first spraying achieved an average number of fruits that were 2.5% above control, the second yielded 6% above the first. However, the third yielded 26% above the second and 33% above the first. The amounts of increases in foliar applications were 15% greater from the first spraying to the second, and 13% greater from the second to the third, comprising a 30% increase from the first to the third spraying.”¹²

As a result of this and other pioneering research Albion has conducted in plant nutrition, Dr. Harvey Ashmead was invited to present a summary of his research to the Food and Agricultural Organization (FAO) of the United Nations. The paper was given in Rome, Italy, and Dr. Ashmead concluded by saying,

Foliar spraying with chelated amino acid trace minerals does hold promise to be the ideal method of trace mineral application after plants have sprouted and in the stress of rapid growth or other stresses such as chlorosis. Foliar spraying is indeed synergistic with seed treatment. Together, they offer the best for plant performance as far as trace mineral application is concerned. Obviously, there are other facets of horticulture in addition to the correct application of trace minerals.

“In summary, I have discussed human nutrition and the need for better quality food products. I have also presented data showing how I believe some of the world’s nutritional and food problems can be alleviated. Albion’s research has produced unique products incorporating patented chelated trace minerals that give new hope to farmers everywhere.

1. Greater plant yields which means extra profit and more food
2. Greater plant quality which means better nutrition from edible plants
3. Natural plant nutrition additives which means less synthetics
4. Less toxic plant nutrients
5. Better absorbed nutrients

“We believe we are playing a small part in assisting the countries now producing and can play a part in subproducing areas of the world to be productive in both food and nutrients, for even though I alluded primarily to the application of this chelation process to plants, it has proven to be equally beneficial when fed to animals and even directly to man.

“We do not claim to have invented chelation...nature did that for us. What we have done is discover how to duplicate this process in the laboratory so that it can be applied wherever and whenever needed to plants, animals, and to man. It may now be possible to eliminate, forever, the desperation that comes from trying unsuccessfully to nourish a starving child - or assist in the cure of diseases which come from malnutrition - for whatever reason.

“Working together, helping one another, perhaps we can end the cry of a hungry child. We can, and I believe we should, work together to make good human nutrition universal, thus promoting good health, and therefore happiness, the most precious possessions known to man”

To this end, we should pledge an unending effort - and today I am happy to report that with this breakthrough In plant nutrition, that this end may very well be in sight.¹³

To a degree, Albion Laboratories has succeeded. In response to that presentation and after visiting Albion's facilities in Clearfield, Utah, the United Nations concluded, “Humanity will profit everywhere from the research by Albion Laboratories. Intelligence and health is directly related to nutrition. In the past, research has completely ignored the need for minerals without which the human body cannot exist With Albion's program, we could be looking at the birth of a new era in agriculture and nutrition which could affect mankind's attitude towards world peace.”¹⁴

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