Dr. Donald L. Bath was presented the College of Agricultural and Environmental Sciences Award of Distinction in 1996.

Donald L. Bath, University of California Cooperative Extension specialist emeritus, passed away on Oct. 26, 2013. He was 81.

He earned his B.S. and M.S. in animal husbandry and his Ph.D. in nutrition, all from UC Davis, where he also quarterbacked the Aggie football team and served as president of the Sigma Alpha Epsilon fraternity. In 1963 Bath became a UC Cooperative Extension dairy nutrition specialist based at UC Davis. "Don had a significant impact on my career and my philosophy toward the dairy industry," said Ed DePeters, professor in the Department of Animal Science at UC Davis. "I first met Don when I came to UC Davis in October 1979, as a green Ph.D. from Penn State. It was a meaningful experience for me, because as an undergraduate at Cornell University I used his book, "Dairy Cattle: Principles, Practices, Problems, and Profits "by Foley, Bath, Dickinson, and Tucker in my dairy production class."

During his 30-year career, Bath authored 350 publications, including the widely used textbook. He and his colleagues developed and marketed PC Dairy, one of the first linear programming ration-balancing computer programs. Bath and his UC Davis colleague Vern Marble developed a method for determining total digestible nutrients in alfalfa hay. In 1980, he co-authored "By-products and Unusual Feedstuffs in Livestock Rations," which summarized the scientific literature on the chemical composition of more than 200 by-product feeds, and which remains a reference guide. In the 1980s, when cottonseed meal was commonly used in feed, Bath and DePeters conducted research that demonstrated that canola meal was equivalent to cottonseed meal and opened the California market to canola meal. Canola meal is a common feed ingredient in commodity barns and is widely used in dairy rations on California dairy farms. Bath retired in 1993. "The facts that PC Dairy and the Alfalfa Hay Testing Program each still plays a role in the dairy industry and that canola meal is a primary protein supplement in California demonstrates the significance of Don's science to the dairy industry," said DePeters.

Bath is survived by his wife Gloria, their sons Robert and Daniel, five granddaughters and his sister Darlyn. Gifts in Bath's memory may be made to the "Donald Bath Animal Science Student Award," payable to the UC Davis Foundation, UC Davis, CAES Dean's Office, One Shields Ave., Davis, CA 95616.

Don Bath Memorial Lecture: The Future of Alfalfa in the West = Water!

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Abstract

With drought conditions in some areas of the west in 2014, including extreme drought in California and resulting record high alfalfa hay prices early in the season, one could ask the question "what is the future of alfalfa hay production in the West?" This question has more significance in the central and northern valley of California where permanent crops, particularly almonds and other tree crops that use less water have replaced acres that were once used for alfalfa hay production. In some other western States such as Idaho and Utah, alfalfa hay acres and production seem to be more impacted by prices on corn, wheat, and potatoes. While irrigation water availability impacted alfalfa hay acres and production in 2014, one thing that was evident in the west but particularly in central California was the significant increase in groundwater usage during a period of reduced surface water availability. This will be a bigger issue during drought conditions in the future with new groundwater management legislation in California in 2014. Some States are already involved in groundwater management. There are a growing number of crops in the central and northern valley of California that use drip irrigation which is a big factor during periods of tight irrigation water supplies. Another thing discovered during the severe drought in California in 2014 and the record high prices on milk cow quality alfalfa hay – hay will move from throughout the west to central California if there is enough spread between FOB and delivered prices. This will be a bigger issue in the future as all signs point to fewer acres of land available in California for alfalfa hay production in the years ahead.

2014 - A Year with Many Dynamics in Alfalfa Hay Production and Usage

While the seven western States experienced abnormally dry to extreme drought conditions in 2014, California by far had the worst drought conditions of any State in the nation. However, in October, alfalfa hay production in the seven western States in 2014 was forecast by USDA to be up 8 percent from 2013. I disagreed with USDA on their forecast for alfalfa hay production in California for 2014 after I surveyed 25 bigger alfalfa hay growers in California representing nearly 63,000 acres. These growers reported alfalfa hay production to be down 7 percent from 2013 compared to the 8 percent higher production reported for California by USDA. While I

believe alfalfa hay production was down in California in 2014 it would have been down much further had it not been for an increased amount of groundwater used for alfalfa hay production. Conversely, a survey I conducted of bigger alfalfa hay growers in Idaho showed alfalfa production to be up 8 percent from 2013, close to USDA's forecast of 9 percent higher alfalfa hay production for the State of Idaho in 2014. Groundwater was a bigger factor in alfalfa hay production in other areas of the west besides central and northern California. In Nevada, alfalfa hay production in Lovelock was down dramatically due to very low supplies of surface water from Rye patch Reservoir while alfalfa hay production in other areas such as Diamond Valley were normal due to groundwater usage.

One thing evident in 2014 was the above normal movement of alfalfa hay and straw from western States into central and north central California for dairy cows. With the largest concentration of dairy cows in the U.S. located in central California (1.3 million dairy cows between Kern and Stanislaus Counties with nearly 40% of those in Tulare County), there was strong demand for alfalfa hay and other forages. Normally, California receives very little alfalfa hay from Idaho but that was not the case in 2014 according to industry contacts (because of budget cuts, the California border stations are no longer furnishing in-shipped alfalfa hay data from western States to me). You rarely see wheat straw shipped from out-of-State into California but in 2014 a large amount of straw shipped into central California from throughout the west as dairymen were using straw with other by-product feeds to lower the cost of feeding dry cows. This included ryegrass straw shipped from Oregon and Washington. Delivered prices on straw reached record high levels. This pushed the delivered market on dry cow alfalfa hay in central California lower from July through the fall as demand declined.

The story was much different on higher quality milk cow alfalfa hay in most areas of the west. Due to tight supplies of Premium and Supreme quality alfalfa hay, the market stayed strong through the season in many areas with prices slipping late in the fall due softer milk prices. As a result of the strong market on Premium and Supreme alfalfa hay, dairymen throughout the west reduced the pounds of alfalfa hay fed to milk cows. In California, pounds of alfalfa hay fed per head/per day in 2014 dropped from 9.44 pounds in the first quarter to 7.97 pounds in the third quarter, according to the California Department of Food and Agriculture. Supreme alfalfa hay delivered to central California dairies ranged from $330 to $370 per ton through the season compared to a rolled corn delivered price in a range of $198 to $250. There were several reasons for the tighter supplies of higher quality alfalfa hay in the west in 2014, including an increased amount of rain damaged hay, particularly in Idaho and Utah, disappointing tests on non-rain damaged alfalfa hay in some areas, alfalfa growers in some areas such as central and northern California that shifted to longer cutting cycles earlier in the season than normal due to uncertain irrigation water supplies. As previously mentioned, the market slipped late in the year on higher quality alfalfa hay due to declining milk prices but the drop was nothing like what was seen in the low to middle quality alfalfa hay markets. Indications are pointing to a bigger carryover of alfalfa hay in the west into 2015 but much of it is low to middle quality.

Alfalfa Hay Production in the West in Future Years – Where are we headed?

With drought conditions spurring record high delivered prices on alfalfa hay in Central California in 2014, particularly on Premium and Supreme qualities, and reduced feeding of alfalfa hay by dairies the question could be asked, "What is the future of alfalfa hay in the West?" While dairies in the west reduced the pounds of alfalfa hay fed to milk cows and some dairies stopped feeding alfalfa hay, a few dairy nutritionists that I spoke with in central California in early January 2015 still believe that alfalfa hay, even fewer pounds than last year, has value in milk cow rations. One nutritionist said that he keeps alfalfa hay in milk cow rations because it is an effective fiber with protein and compared to costs of other protein feeds it has value. His comment "normally when prices are very high, like in 2014, prices will come down the following year." Drought has changed this on the short term but historically he is correct. Another nutritionist said he keeps alfalfa hay in the ration for "intrinsic value." He also mentioned that high quality alfalfa hay helps milk production, particularly in central California during the hotter months of July through September.

While irrigation water is a critical element in growing alfalfa hay, there will be dry years when irrigation water in the west will be less than normal and there will be years when rainfall and snowpack will be normal to above normal. Unfortunately, in California there has been two years of drought with 2014 being the driest on record. California voters passed a bond measure in the fall of 2014 that will spend billions of dollars to build more water storage in California to capture water in those years when rainfall and snowpack are more plentiful. In the Sierra Nevada's on December 30, 2014, snowpack was around 50 percent of normal. While there is still time in the winter for more snow in the mountains and rain in the valley, another year of below normal snow and rain in California would be a hardship on the State, particularly agriculture. With the outlook for fewer acres of land available for alfalfa hay production in California in the coming years due to competing crops, such as tree crops, alfalfa will need to try to compete as a more efficient user of water in the future. This could increase the use of drip irrigation on alfalfa hay. One of my contacts in Central California who is a hay dealer and a dairyman has had success using drip irrigation on alfalfa hay this past year and wants me to look at his fields when I am at the World Ag. Expo in Tulare in early February. I will report this in my presentation on March 3 at the Western Dairy Management Conference. Drip irrigation has been tried before in central California with mixed success but I think it is something that needs to be looked at again and build on successes of those that are making it work. We are in an era of competing crops and the efficient use of water will become a bigger factor when it comes to decisions of what farmers will plant, particularly in the central valley where the largest amount of alfalfa hay is grown in California.

In the years ahead when there is below normal production of milk cow quality alfalfa hay in central California due to drought, the hay will come from other States. Even with the outlook for fewer acres of alfalfa hay in California in the years ahead due to competing crops, particularly

tree crops, some of this shortfall in alfalfa hay production will be made up from hay from the southern desert (including Arizona), Idaho, Utah, Nevada, Oregon, and at times from Washington, Colorado and Montana. With the prospect of lower freight rates in 2015, hay could ship from Midwestern states. There was dry cow alfalfa hay delivered to central California from Canada in 2014. If there is demand and enough spread between the fob and delivered price, the hay will come. Early estimates are that alfalfa hay acres will increase in Idaho, Utah, and Washington in 2015. The jury is still out for California but with a 7 percent decline in alfalfa hay acres in the Imperial Valley due to increased Durum wheat plantings and with some growers holding back on fall plantings in the central valley due to irrigation water uncertainties, I'm not sure that alfalfa hay acres in California will be up at all in 2015. The key will be winter and early spring plantings in central California.

An interesting thing happened in the fall of 2014 in central Utah that may not occur when we get into new crop 2015 alfalfa hay when there is more volume of hay on the market but non-GMO alfalfa hay in a barn sold for more money to export buyers than the same quality GMO (Genetically Modified Organism) alfalfa hay would bring from dairies on the domestic market. The reason is that there is strong demand for non-GMO alfalfa hay to export to China. Currently, the leading export market for alfalfa hay from the west coast is China and it appears they will be strong buyers in 2015. In July of last year, China announced a zero tolerance for GMO alfalfa hay (Round-Up Ready) and with new testing procedures they are not accepting alfalfa hay that is GMO. In late 2014 China accepted a strain of GMO corn from the U.S. so it appears that they will eventually accept GMO alfalfa hay.

Conclusion

While much of the seven western States had dry conditions in 2014, alfalfa hay production reported by USDA in October was still up 8 percent from 2013. Groundwater played a bigger role in alfalfa hay production in 2014 and will be a bigger part of alfalfa hay production in dry years in the future. Groundwater management will impact growers in areas where there is demand for water from urban and agricultural users. While wet and dry cycles will continue in the west in the future, there are efforts to increase water storage in California and drip irrigation may be used more in some areas, particularly in central California to make alfalfa more competitive with crops currently using drip irrigation. In future years when alfalfa hay production in California is impacted by drought, the large dairy industry in the central valley will draw alfalfa hay from other States, even from States that rarely export alfalfa hay to California. This will also hold true with Idaho or other dairy States in the West.