

Colorado Bean News

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Future of Irrigated Agriculture

Reprinted from CAST, August 1996

Irrigated agriculture in the western United States is faced with a confluence of change. Competition for increasingly scarce water supplies to serve growing urban and environmental needs means that water will become less generously available for irrigation. Ground water overdraft, which occurs in many locales throughout the West, cannot be sustained indefinitely, and some irrigated acreage ultimately will disappear as a result. Historically, federal water and agricultural policies have been very supportive of irrigated agriculture. Future policies will be less favorable as the federal government continues to transfer responsibility for water management to the states, and agricultural commodity programs and other agricultural support programs are curtailed or phased out. Environmental policies undoubtedly will require irrigated agriculture to economize on the use of natural resources and to minimize its contribution to environmental degradation. Simultaneously, the economic circumstance of western agriculture will become more demanding as markets for food and fiber become increasingly globalized.

Historically, western growers generally have been adaptive and innovative and thus have been able to adjust to change successfully. Many strategies are available to growers attempting to adapt to the future. These strategies include altering the crop mix to emphasize high-value fruits and vegetables; employing sophisticated technology and management schemes in managing water at the field level; and investing in research to develop improved crops, cultivation methods, and irrigation-water management techniques.

Most of the laws and institutions governing and guiding irrigated agriculture were developed in another era and are ill suited to one in which premiums will be placed on efficient water use, flexibility, and adaptability. These include antiquated systems of state and federal water laws, enforcement systems that create uncertainty about who is entitled to use how much, legal systems that fail to provide incentives to manage water efficiently, barriers to market-like exchange of water rights, and water management jurisdictions that do not properly account for the various interdependencies in water use. In addition, existing rates of investment in agricultural research and development in the United States are below those in other developed countries despite the fact that research and development will be critical if U. S. growers are to adapt and to compete effectively in global markets.

[The "Future of Irrigated Agriculture" was written by a task force of 8 scientists. The 75-page publication, Report 127, is available for \$ 20.00 + \$ 3.00 postage/handling from CAST, 4420 West Lincoln Way, Ames, IA 50014-3447; telephone - (515) 292-2125; fax - (515) 292-4512; Internet - cast@cast-science.org]

MAILING LABEL UPDATE

Please send changes to:

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Fort Collins, CO 80527-1820

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Colorado Bean News is supported in part by your voluntary check-off dollars administered by the Colorado Dry Bean Administrative Committee with headquarters at 1555 So. Havana Street - Unit Q, Aurora, CO 80012 (303-338-5861).

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Change of Address

The COLORADO DRY BEAN ADMINISTRATIVE COMMITTEE has moved !

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 Aurora, CO 80012

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CDBAC News

The CDBAC and Colorado Department of Agriculture are pursuing innovative ways to promote and showcase Colorado dry beans in local, regional and national restaurants and chains. The CDBAC + CDA are approaching these food entities with the catchy lead-in "We believe that the thousands of customers who visit your restaurants would enjoy a 'signature' dish made from Colorado beans. We would be able to provide a master chef to help create the dish or you may wish to use your own product development staff."

Contacts have already been made with the following food outlets: Boston Market, Zuma Mexican Grill, Round The Corner, Black-eyed Pea, Village Inn, Chili's, and Honeybaked Ham Company.

Look for more details in future issues of COLORADO BEAN NEWS as this exciting project and others such as those at Colorado State University supported by your checkoff dollars pay dividends for the Colorado Bean Industry.

CD-ROM Release

A new CD-ROM from Colorado State University Cooperative Extension provides farmers with gigabytes of information and illustrations on major pests of five field crops (including dry beans) and two vegetable crops. Alfalfa, corn, dry bean, sunflower, wheat, onion and potato growers will be interested in AG Photo CD-1 Ver. 2.0, available for \$ 40 + shipping & handling. The disc is applicable to both Windows and Macintosh systems. [To order your copy, contact the Cooperative Extension Resource Center at (970) 491-6198, fax (970) 491-2961, or email cerc@vines.colostate.edu] A full refund is available within 30 days if software or hardware is incompatible.

Disc co-producer and CSU Extension Plant Pathologist Howard Schwartz said the disc contains interactive sequences of 300 digital images illustrating stages of growth, development and management, and corresponding major pests including diseases, insects and weeds.

“We also included the principles of Best Management Practices and Integrated Pest Management, and added a keyword searchable image database of nearly 4500 thumbnail images of agriculture and agricultural production,” said Mark McMillan, disc co-producer. “All of our images are high quality and high resolution.”

The disc contains all software necessary to play, search, view and export the 300 images, which can be displayed via a portable Kodak CD (or similar) Player, on a television monitor or with a compatible video projector. The primary objective of this CD is to provide high quality illustrations of agricultural practices and crops.

Look for future CD products that will combine interactive illustrations such as those on AG Photo CD-1 with in-depth resources of and recommendations for bean production practices and integrated pest management strategies for Colorado and surrounding region.

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MARKETING OF DRY BEANS

Excerpts from BEAN MARKET NEWS, 1995 Summary

USDA Purchases - PL 480 Program for Export (metric tons):

Market Class	FY 93	FY 94	FY 95
Pea, S. White	4,110	28,270	1,500
Pinto	24,930	55,320	64,422
G. Northern	5,170		
Small Red	4,500	7,185	2,542
Black	6,960	1,390	460
Light Red Kidney		1,020	1,080
Dark Red Kidney		1,214	2,133

U. S. Exports of Dry Beans (cwt)

Market Class	10/90-09/91	10/91-09/92	10/92-09/93	10/93-09/94	10/94-09/95
Miscellaneous	1,389,714	1,505,896	865,173	742,245	596,719
Black	510,563	238,868	294,909	198,612	236,554
Garbanzo	not applicable	118,652	45,679	54,230	213,880
G. Northern	1,227,169	612,989	340,743	361,488	784,375
Lima	471,167	517,508	464,664	483,667	450,069
Navy/Pea	2,668,227	2,039,387	1,811,696	1,576,532	2,035,265
Pinto	4,138,056	2,176,822	1,246,503	1,860,264	2,504,514
Red Kidney	482,543	966,761	785,808	776,196	788,299
Small Red	not applic.	not applic.	266,757	389,928	391,030
Other Whites	124,913	99,119	151,214	35,406	160,781
Seed	355,558	453,067	442,287	239,552	243,079
TOTAL:	11,367,910	8,729,069	6,715,432	6,718,120	8,404,565

World Dry Bean Production (000 Metric Tons):

Area	1979/1981	1991	1992	1993	1994
WORLD	13,488	16,632	15,905	16,741	17,827
Africa	1,501	2,000	1,828	1,936	1,832
North/Central America	2,618	3,485	2,263	2,810	2,899
South America	2,733	3,328	3,421	3,017	3,939
Asia	5,846	7,156	7,826	8,848	8,641
Europe	726	581	487	443	436

1996 NORTHEASTERN COLORADO PINTO BEAN VARIETY PERFORMANCE TRIALS

Jerry J. Johnson, John F. Shanahan, Howard F. Schwartz, Mark A. Brick, James P. Hain, Cynthia L. Johnson, and J. Barry Ogg, Colorado State University

Colorado State University personnel annually evaluate commercial and public dry bean varieties at several locations in Colorado to assess yield and adaptation to Colorado growing conditions. In 1996, the trials were conducted in northeastern Colorado at Burlington, Eaton, and Yuma. Although this report only concerns pinto bean variety results, three separate market classes were tested: 1) pinto, 2) light red kidney, and 3) special (black, great northern, small white, and navy). A randomized complete block field design with four replicates was used in all trials. Test plots were planted and harvested by Colorado State University personnel with CSU equipment. The seeding rate was approximately 87,120 seeds per acre. Plots consisted of four 30 inch rows, and harvest area was approximately 200 sq.ft. All trials were situated in commercial bean fields to expose varieties to the same diseases, insects, and climatic conditions as faced by Colorado bean growers. Grain yields, in pounds per acre, were adjusted to 14% moisture content.

fungicide was flown on after hail (hailed on three times during July and August 1996 but still managed to produce good yields), rust was present late. Yuma: Previously in corn, planted 6/6, fertilizer was 50 N and 10 P₂O₅, herbicide was dual and treflan, fungicide was copper (4x), rust, bacterial brown spot, and common bacterial blight were all present in this trial. Poor plant stands in 14 plots resulted in average variety yields being based on remaining plots of each variety.

Description of Selected Pinto Bean Varieties

Apache - An early-maturing, rust resistant, large-seeded variety from Idaho Seed Bean. **Bill Z** - This Colorado bean industry standard was a 1985 CSU release with resistance to bean common mosaic virus (BCMV) and tolerance to bacterial brown spot (BBS). **Chase** - This 1993 U. of Nebraska release topped the 1995 bean variety trial for yield at Ovid and is resistant to rust and white mold (WM), but


1996 Season Summary

This year was a full cropping season characterized by early seeding, plentiful and well-distributed rainfall, and absence of water stress so often brought on by periods of high summer temperatures. There were sufficient growing degree-days without periods of deleteriously high temperatures. There was no killing frost before harvest and full-season varieties were able to reach complete maturity in the field. Leaf rust, bacterial brown spot, common bacterial blight, and white mold were generally controlled until late in the season. The 1996 bean crop was damaged by frequent July and August hailstorms, bronzing and by heavy late season precipitation that impeded harvest operations and may lead to lower grain quality.

Trial Conditions

Burlington: Previously in corn, planted 5/23 (obtained good plant stands despite crusting prior to emergence), fertilizer was 80 N and 40 P₂O₅ /acre, herbicide was sonalan/eptam, and fungicide was tilt (1x) and champ (2x), diseases present were rust and bacterial brown spot. Eaton: Previously in corn, planted 5/16, no additional fertilizer, herbicide was dual+eptam, sulfur

Continued on page 6



**WESTERN
INTERNATIONAL
GRAIN**

**DRY BEAN RECEIVING &
PROCESSING**

Burlington:	Mobile	(719)349-2326
		1-800-827-9559
Keenesburg:		(303)732-4241
Milliken:		1-800-635-2326

Continued from page 5

susceptible to fusarium wilt (FW). **RNK 179** - A Rogers Seed Co. line susceptible to rust but moderately resistant to some bacterial diseases. **USWA-19** - Soon to be a USDA-ARS (Prosser, WA) release resulting from a cross of 'Othello'/'Sierra' with rust, BCMV, and Curly Top Virus resistance as well as strong tolerance to the root rot complex. It varies in maturity from the same as 'Othello' to 5-7 days later and is larger-seeded than 'Othello'. **USWA-20** -Soon to be a USDA-ARS (Prosser, WA) release from a cross of 'Othello'/'Sierra' that is both large-seeded and high yielding with broad spectrum resistance to Fusarium Yellows root rot disease. It is later maturity than both 'Othello' and USWA-19. **Vision** - An upright variety resistant to rust from Asgrow Seed Co. Under 1996 Colorado conditions it matured late but was resistant to rust.

1996 Pinto Bean Variety Performance.

Variety*	Location			Averages		
	Burlington Yield	Eaton Yield	Yuma Yield	Yield	Moisture	Seeds
		lb/ac		lb/ac	%	#/lb
USWA-19	2670	2010	2261	2314	13.1	1234
USWA-20	2663	2213	1959	2278	14.1	1260
RNK 179	2323	2332	2142	2266	14.5	1277
Vision	2658	2279	1799	2245	15.8	1288
Bill Z	2088	2080	2107	2092	13.2	1373
Chase	2183	1850	2203	2079	14.0	1355
FX930101**	1850	2235	————	2043	12.9	1274
Olathe	1986	1996	2103	2028	14.5	1322
Maverick	2158	1786	2114	2019	15.1	1341
GTS-900	2360	1871	1711	1981	13.9	1324
CO49137**	————	2186	1749	1968	14.8	1367
CO49144**	————	2230	1700	1965	16.7	1486
NE94-4	2112	1875	1902	1963	15.0	1441
Apache	1596	1742	2383	1907	14.2	1303
UI 114	1721	2039	1716	1825	14.4	1328
95YT122***	————	————	1816	1816	18.0	1418
Hatton	1822	1715	1712	1750	15.1	1265
RNK 178**	1797	————	1628	1713	15.4	1424
Averages	2132	2028	1944	2030	14.5	1330

*Varieties ranked by the average yield over three locations in 1996.

Planted at one location. *Planted at two locations.

ACKNOWLEDGMENTS

Bean variety trials are made possible due to funding from the **Colorado Dry Bean Administrative Committee** and the generous contribution of equipment, time, and land made by three Colorado bean producers who hosted these trials, without recompense, on their farms: Steve Scott (Burlington), Chuck Winter (Eaton), and Troy Newton (Yuma).

The Colorado State University Dry Bean Improvement Team

Crops Testing (Dept. Soil and Crop Sciences): Jerry J. Johnson, Extension Crop Production Specialist; John F. Shanahan, Extension Crop Specialist; James P. Hain, Research Associate; Cynthia L. Johnson, Research Associate; Mark Weimer, Research Associate. **Plant Breeding**: Mark A. Brick, Plant Breeder, and J. Barry Ogg, Research Associate, Soil and Crop Sciences; Calvin H. Pearson, Western Slope-Fruita; Abdel Berrada, Southwestern Research Center; Frank C. Schweissing, Superintendent, Arkansas Valley Research Center. **Pest Management**: (Dept of Bioagricultural Sciences and Pest Management) Howard F. Schwartz, Extension Plant Pathologist; Scott Nissen, Extension Weed Scientist; Frank Peairs, Extension Entomologist; Stan Pilcher, Extension Entomologist, Washington County.

THE ANDEAN BEAN NETWORK

Excerpts from Growing Affinities, CIAT • By Eduardo Figueroa Jr., June, 1996

Last century, when the South American Liberator Simon Bolivar dreamed of uniting the Andean countries, little did he imagine that the common bean would someday provide a way of accomplishing this goal. In those days the protagonists were politicians and soldiers, whose ideas and ambitions got in the way of cooperation. But today scientists, technicians, and farmers - disregarding national differences - are uniting the region to face a common challenge; using agricultural research to fight poverty, ensure food supplies, and preserve natural resources.

Beans are the unifying element of this work, because they are an essential part of the Andean zone's diet and culture. Here and throughout Latin America, the crop provides a protein-rich food that low-income families can afford as well as a livelihood for millions of small scale farmers who cater to urban markets.

Until the early 1990s, the region's production of this staple was in decline for a number of reasons, ranging from the biological to the economic and political. Trends in supply and demand at that time pointed to a collective bean deficit of 80,000 tons yearly for Bolivia, Ecuador, Peru and Venezuela by the year 2000. By 1995, however, production had risen sharply, to a large extent as a result of increasing yields. Even so, there is a danger that efforts to intensify production could have dire environmental consequences, including the overuse of pesticides and high rates of soil erosion.

In search of solutions, national bean researchers are leaving their experiment stations and crossing national borders as partners in the Andean Bean Research Network (called PROFRIZA, its Spanish acronym). The project is funded by the Swiss Development Cooperation and is coordinated by CIAT, which also provides improved germplasm, technical assistance, and training. Network participants include national research institutions as well as state and private universities, ministries of agriculture, and nongovernmental organizations.

The most important partners, though, are the smallholders whose families have grown beans in the Andean zone for thousands of years. They share their knowledge with scientists and play an active

role in research aimed at developing and evaluating new technologies. The overall goal of PROFRIZA is to improve bean production by strengthening local problem-solving capacity. Projects deal with farmer participation in research, smallholder seed production, development of improved varieties, integrated pest and disease management, cropping systems, soil conservation and management, technology transfer, and promotion of bean consumption.

Note: CIAT is offering 2 videos on beans: "Every Corner of the Land" - 13:50 minutes on Integrated Pest Management in the Andes + "To Leave Something More" - 11:22 minutes on the Andean Bean Research Network. Specify VHS format, and the total cost is U.S. \$ 50.00 for the combined videos on a single cassette. Mail your request + check by airmail to: CIAT Communications Unit, Apartado Aereo 6713, Cali, COLOMBIA, South America.

[CIAT's URL address on the World Wide Web is: <http://www.ciat.cgiar.org>]



BURLINGTON MARKETING CORPORATION

5 miles east on Highway 24
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Burlington, Colo. 80807
(719) 346-7770 Fax (719) 346-7799

CALIFORNIA BEAN NEWS

Reprinted from the BEAN MARKETER, September 1996 Issue

Beans Beans Beans - California's Finest Recipes

The California Dry Bean Advisory Board, 531-D North Alta Avenue, Dinuba, CA 93618 has released a new bean cookbook that sells for \$ 8.00 a copy (\$ 7/each if you buy 5 or more copies). This new cookbook features all new recipes, i.e., there are no "repeats" from their original cookbook with over 75,000 copies in print. Further, the new recipes tend to be more in keeping with today's trend toward "lighter" dishes — less fat, less calories and more attention to healthy eating.

Certainly we don't want to imply that the recipes in the original book were bad for you, because any time you're eating beans, there's bound to be good nutrition involved, but in the new recipes we've taken even more care to keep them free of excess fat, and many of the recipes bear the "5-a-day" seal,

meaning they've met the criteria established by the Produce for Better Health Foundation.

One of the unique aspects of the new cookbook is its "stand alone" feature, a built-in stand in the back cover that allows the cook to stand the book up on a reading position while cooking.

New Bean Promoter for ADBB

In an attempt to link beans with an upscale, healthy and athletic lifestyle, the American Dry Bean Board has contracted with former Olympic Ice Skater Debi Thomas to promote beans. Working through **B. E. A. N.** (Bean Education and Awareness Network), the ADBB's public relations firm will use her interviews, news releases and photos, as well as a media kit which will be distributed to 1,200 food editors and health and fitness editors at daily newspapers, national magazines, wire services, and national TV and radio programs.

Included in the media kit is a news release headlined, "Using Her Bean: Debi Thomas Focuses on Nutrition to Fuel Skating Comeback." The media kit itself is called "Beans on the Training Table", and also includes a photo of Debi, other releases, and support materials focusing on the Family Training Table Theme. The support materials include: (1) Eat to Compete: Beans Build Better Athletes, which features a quote from the executive chef of the Jacksonville Jaguars, (2) General Nutrition Guidelines: Active People Need Beans, which gives the editors basic nutritional information about beans, and (3) Beans Take a Seat at the Family Training Table, which includes seven meal plans, complete with bean recipes, for the family table.

In other BEAN activities, a recipe release went out to 650 food editors at daily newspaper, national magazines and producers for national TV and radio food programs (which includes wire services). The Market Research Committee, working in conjunction with ADBB, have prepared a survey on bean consumption. The \$ 25,000 survey will be conducted through 10-minute phone interviews during September. Results of the survey will shape the ADBB's thinking in regards to future publicity and public relations activities.

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NEBRASKA BEAN BAG Excerpt

Article by Craig Moss, Fall 1996 Issue ADBB Delegate for the Nebraska Dry Bean Commission

Good Morning America

Beans were featured on ABC-TV's "Good Morning America" last spring. The segment featured the cookbook author, Brooke Dojny and Charlie Gibson preparing a main course meal made with Great Northern beans. All of our positive messages about beans were communicated in the five minute segment, including taste, nutrition, popularity, wide variety, interchangeability, ease of preparation, and convenience.

We were involved in this story in several ways. First, we provided background information to Full of Beans cookbook author, Brooke Dojny. The American Dry Bean Board and the California Dry Bean Advisory Board are acknowledged in her book. We also provided information to her publicist for press materials to promote the cookbook.

For the producers of Good Morning America, Manning, Selvage & Lee researched bean production and consumption information through the USDA and provided a press kit containing many BEAN releases, including folate information, Gallup poll results, nutrition, lifestyle/popularity, cooking suggestions and several recipes. Charlie Gibson's lead into the segment sounded exactly like our news releases.

The audience for Good Morning America is 4.9 million. This segment provided excellent exposure for beans. If the time had been purchased as advertising, it would have cost \$ 230,000.



CSGA
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Green

Drum-Dried Bean Meal

Michigan Dry Bean Digest, Summer 1996 Issue
 Excerpts from article by L. G. Occena, M. A. Uebersax, G. L. Hosfield
 Michigan State University, East Lansing, MI

The following major reasons have been cited for the surge in demand for dry beans: (a) rising interest in nutritious and healthy foods, (b) increased interest in ethnic foods featuring dry edible beans, (c) rising popularity of Mexican and East Indian cuisine, and (d) a shift in the makeup of the general population, with increasing proportion of Hispanics and Asians. This trend has subsequently created a substantial domestic demand for canned beans, particularly black beans. However, major end-product bean foods are directed toward milled, mashed or mixed recipes.

The time involved in preparation and the antinutritional and flatulence factors associated with consumption are considered major constraints limiting wider utilization of dry edible beans. Processing strategies to eliminate these digestibility factors include soaking, extractive pretreatments, germination, dehulling and various cooking and

drying methods. Cooking of dry edible beans is essential to render palatability and inactivate toxic substances. Steam blanching inactivates enzyme systems, enhances digestibility by inactivating biologically active inhibitors, and stabilizes flavor by controlling the oxidation of chemical constituents.

Drum-drying is a potential method of processing dry edible beans into pre-processed food ingredients which may be used directly or as a component of formulated foods. A basic drum-drier is comprised of one or more hollow steel drums (rollers) which slowly rotate and are heated internally by pressurized steam to 120 - 170 C. Drum- driers use conduction heat transfer for vaporization of water at the external drying surface. A feeding device is used to apply a thin, uniform layer of food material to be dried on the hot outer surface. Before the drum completes one revolution (within 20 - 30 seconds), the feed material applied on the periphery is dried as the heated drum rotates the 'doctor' blade (knife) which contacts the drum surface uniformly along its length, and scrapes the thin layer of dry material from the drum surface.

Dry Edible Bean Consumption

Excerpt from Michigan Dry Bean Digest, Summer 1996 Issue
 Data Source: Economic Research Service, USDA

Pounds Per Capita Consumption in the U. S.:

Year	Pinto	Navy	G.N.	R.Kd	Limas	Other	Total
1971	2.5	1.8	0.5	0.5	0.3	1.2	6.8
1976	2.5	1.4	0.4	0.6	0.3	1.2	6.4
1981	1.9	1.2	0.3	0.3	0.3	1.4	5.4
1986	2.6	1.2	0.5	0.5	0.4	1.4	6.6
1991	3.3	1.5	0.5	0.5	0.2	1.3	7.3
1996	3.0	1.5	0.4	0.6	0.3	1.4	7.4

[Note: the major contributor to increased consumption is in the pinto class]

USDA, NASS PRODUCTION ESTIMATES

U.S.D.A. National Agr. Statistics Service - 8/12/96

STATE	Harvest (Acres)		Yield (lbs/Acre)		Production (CWT)	
	1995	1996	1995	1996	1995	1996
California	137,000	130,000	2,160	2,100	2,960,000	2,730,000
Colorado*	165,000	135,000	1,550	1,750	2,558,000	2,363,000
Idaho	108,000	93,000	2,000	2,000	2,160,000	1,860,000
Kansas	31,000	29,000	1,550	1,800	481,000	522,000
Michigan	385,000	310,000	1,800	1,400	6,930,000	4,340,000
Minnesota	150,000	120,000	1,370	1,600	2,055,000	1,920,000
Montana	10,800	10,300	1,900	2,200	205,000	227,000
Nebraska	205,000	190,000	1,750	1,850	3,588,000	3,515,000
N. Mexico	12,500	12,000	2,010	2,000	251,000	240,000
New York	33,000	29,500	1,630	1,600	538,000	472,000
N. Dakota	540,000	550,000	1,330	1,340	7,182,000	7,370,000
Oregon	10,000	10,100	2,080	1,980	208,000	200,000
Texas	23,000	12,000	980	900	225,000	108,000
Utah	7,000	600	460	600	32,000	4,000
Washington	41,000	36,000	2,200	2,250	902,000	810,000
Wisconsin	9,000	8,100	1,300	1,700	117,000	138,000
Wyoming	32,000	35,000	2,000	1,980	640,000	693,000
U. S. A.	1,899,300	1,710,600	1,634	1,608	31,032,000	27,512,000

* Forecast for 1996 Harvest Data



Front Range Bean Co., Inc.

The Pinto Bean Specialist



Front Range Bean Co., Inc.
 200 W. 1st Ave.
 Yuma, CO 80759
 (970) 848-3818



Ron Rutt - General Manager

Other Locations:

Mead, CO (303) 535-4468
 Lawnridge, KS (913) 332-2001

BEAN RECIPES

By Lynne Bigwood, Home Economist
Reprinted from NORTHARVEST BEAN GROWER, Fall 1996 Issue

Chili-Chicken Casserole

8 Servings, 370 calories/serving, 31% calories from fat

Ingredients:

4 oz tortilla chips, slightly crushed
1 can 17-oz whole-kernel corn
5 boneless chicken breast halves, 1-inch cubes
1 small onion, diced
1 T oil
1 can 15-oz tomato sauce
1 can 15-oz kidney beans, drained
2/3 T chili powder, to taste
1/2 t black pepper
1 cup mozzarella cheese, shredded
1 cup cheddar cheese, low fat, shredded

Method:

Place crushed chips in bottom of 13 x 9 x 2 inch baking pan. Cut the chicken breasts in 1-inch cubes, then cook with the onion in 1 tablespoon oil until the onions are tender and the chicken is cooked. Stir in tomato sauce, corn, beans, and spices. Pour this mixture over the chips in the pan. Sprinkle the cheese over the sauce. Bake in preheated 350 degree oven for 30 minutes or until heated through and cheese melts.



Chuckwagon Pot Roast

8 servings, 610 calories/serving, 30% calories from fat

Ingredients:

3 lb chuck roast
2 t salt
1/4 t ground black pepper
1/2 t paprika
1.5 cups dry pinto beans
2 cups water
2 T oil
1/2 t garlic, dry, minced
1/2 cup onion, chopped
1 can 10.5 oz beef broth
1/2 cup chili sauce
3 carrots, cut in 1-inch pieces

Other favorite vegetables can also be added

Method:

Combine salt, pepper, and paprika in a small bowl; rub on the outside of the roast. Cover and refrigerate roast several hours or overnight. Also the night before, soak beans using preferred hot soak method. Drain water from beans, and cover with fresh water and simmer until tender. In a large pot, brown the roast in oil to a deep brown. Remove roast from pot, saute onion and garlic 3 - 5 minutes, scraping browned bits from bottom of pot. Add beans and water, mix well. Place roast in pot with beans and sauce; baste roast with sauce. Cover pot, simmer roast and beans for 2 hours. Add carrots, cover and simmer 30 minutes. Remove roast, slice meat, and serve on a platter surrounded with beans and carrots; pour sauce over meat and vegetables. This roast can also be baked in the oven for 3 hours at 350 degrees; add carrots during the last hour.

Crockpot Cassoulet

6 servings, 395 calories/serving, 19% calories from fat

Ingredients:

- 1 cup carrots (3 medium sized), cut in 1/2 inch pieces
- 1/2 cup onion (medium), chopped
- 1/3 cup water
- 1 can 6-oz tomato paste
- 1/2 cup apple juice concentrate
- 1 t garlic powder
- 1/2 t thyme, crushed
- 1/8 t cloves, ground
- 2 bay leaves
- 2 cans 15.5-oz Navy beans, drained
- 4 boneless chicken breast halves, frozen individually
- 1/2 lb low-fat turkey sausage, fully cooked, 1/4 inch thick slices

Note: A cassoulet is a French stew made by slowly simmering beans with more than one kind of meat. This easy variation makes a delicious supper. Well-trimmed pork chops could easily be added to the stew.

Method:

Put carrot, onion, and water in a small saucepan and bring to a boil, simmer covered for 5 minutes. Put the carrots and onions in the crockpot along with the tomato paste, apple concentrate, and seasonings; add the beans. Place the frozen chicken on top of the bean mixture; place the sausage slices on top of the chicken. Cook on low heat setting for 9 - 10 hours or on the high heat setting for 5.5 - 6 hours. (By using frozen chicken, the chicken will be tender but not overdone after cooking all day.) Before serving, remove bay leaves and skim off any fat.



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BASIC PRINCIPLES OF FIELD RESEARCH

Dr. Mark A. Brick, CSU Bean Breeder

Most agricultural producers and extension personnel are exposed to a great deal of research data that is used to promote a product or variety of a crop. This data originates from university reports, seed companies, chemical companies and elsewhere. Most of these groups are reputable and report accurate data, however there are a few "snake oil" salesmen out there. Therefore it is important to be able to evaluate the reliability of the data we read. To evaluate the quality and reliability of research data we need to understand a few basic principles of a soundly conducted experiment.

There are three essential features of a good experiment. These features ensure the reliability and repeatability of the results. These features are 1) randomization, 2) replication, and 3) freedom from bias. Each of these features are equally important and must be rigidly adhered to. If any one of them are violated, the results of the entire experiment are questionable as in the "weakest link" theory.

Randomization refers to the method in which the treatments are assigned to the unit of material to which one treatment is applied (experimental units). Most agronomists equate the experimental unit with one field plot. For example, if you are conducting a field trial to evaluate wheat varieties and each variety is planted on a plot four feet wide and ten feet long, this area is considered the experimental unit. To assure proper randomization, one simply must be sure that the treatments are assigned to the experimental units at random and not in a way which would bias the results. Randomization can be accomplished by first assigning each experimental unit a number, then assigning treatments to these numbers at random. Assignment of treatments at random can be done by simply picking numbers out of a hat or using a random number table. A common violation of randomization occurs when the treatments are assigned to the experimental units in some preferential manner so that the product or treatment the researcher is testing is assigned the more favorable experimental units. This technique is easily exploited in strip plots that are not replicated. Therefore if you are viewing strip plots in which one company has all their product grouped together and their competitors in another group, the treatment were likely not assigned at random.

Replication refers to the procedure of repeating treatments more than once to measure experimental error. Three to four replicates are often used in agronomic research. Experimental error is calculated as the weighted sum of the differences among treatments across replicates. Without replication, it is impossible to determine if treatments differ due to error or to real differences among the treatments. Replication of treatments can occur at one location or different location as in the case of multiple strip plots at several locations. However, when replications occur over locations, environmental effects can become confounded (mixed in with) with error, consequently error may be increased and precision lost.

Continued on page 15



**PROUD TO BE PART OF THE
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Receiving - Marketing - Processing

Pintos - Great Northerns - Kidneys

Navies - Small Whites - Popcorn

"We have a location near you"

Continued from page 14

During all phases of the experiment the researcher must be careful to be unbiased. A good example of biased data collection occurs when the researcher knows the treatment during collection of data. This is especially true when the data being collected is an arbitrary score such as a visual rating system for something like lodging in cereal crops. To prevent bias the researcher should **always** keep the identity of the plots anonymous during the collection of data. If more than one person collects the data it is a good idea to have each person collect data on separate replicates. If you need to label the plots for public display, limit the labeling to the first replicate and take the notes on the unlabeled replicates. It is more difficult to keep data collection unbiased with large experimental units such as strip tests due to

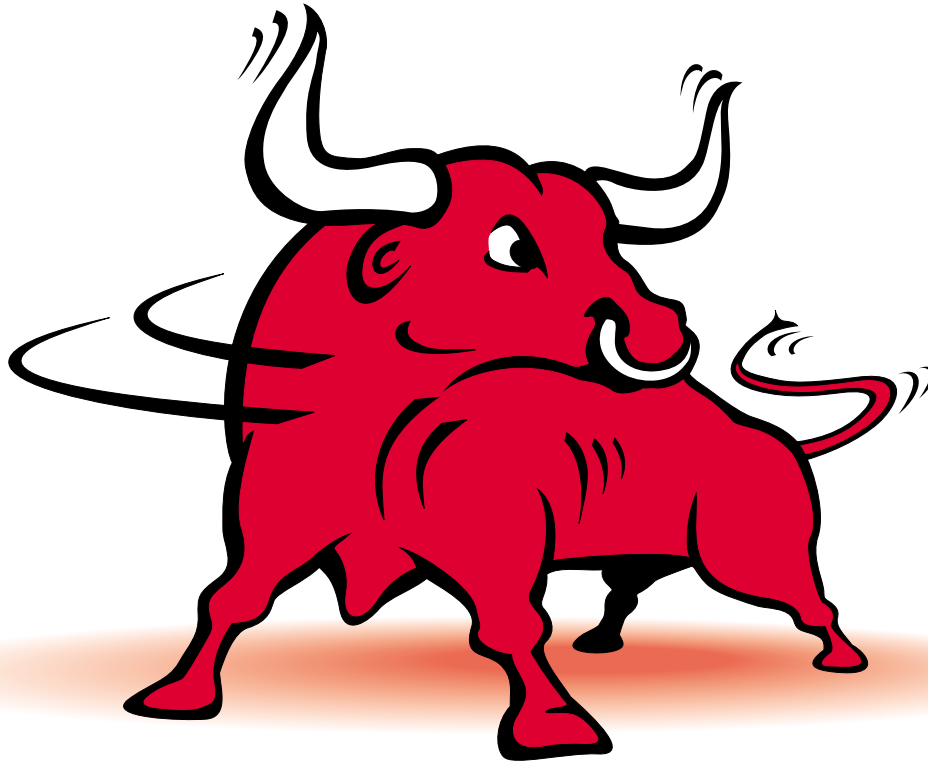
familiarity the researcher has with the visual appearance of the plots.

The field site must also be carefully chosen prior to the onset of the experiment. The site should be fairly uniform in soil texture, slope, fertility, weed problems, and all previous and current agronomic practices. Avoid conducting research near roadways, field paths or where there is a potential for a portion of the plots to be influenced by the environment. It is always a good idea to place a border around the entire experiment to avoid a "border effect" which we often see at the edge or end of most fields. Alleys can also cause border effect, so limit them in size and cut them as late in the growing season as possible.



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Type	Light Red Kidney
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Approximate Seed Count	900
Plant Type	Upright, determinate bush
Disease Resistance	Current races of bean common mosaic virus and current races of bean rust.

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