V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
121	Management of Range Resources	15%		5%	
202	Plant Genetic Resources	5%		15%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		5%	
204	Plant Product Quality and Utility (Preharvest)	5%		10%	
205	Plant Management Systems	20%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		10%	
212	Pathogens and Nematodes Affecting Plants	15%		15%	
301	Reproductive Performance of Animals	5%		10%	
302	Nutrient Utilization in Animals	5%		5%	
305	Animal Physiological Processes	5%		10%	
702	Requirements and Function of Nutrients and Other Food Components	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	12.0	0.0	37.0	0.0
Actual Paid Professional	20.4	0.0	40.2	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
487054	0	959198	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
487054	0	959198	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
649845	0	2621052	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Meet with stakeholder groups to gather input and refine program directions.
- Develop improved crop cultivars acceptable to growers and those who use and process the grain.
- Conduct research on alternative grazing and feeding systems.
- Conduct research on the effect of maternal treatments on the productivity of offspring.
- Present crop and livestock research results at field days and grower meetings, popular press, radio and TV spots, web sites, and educational classes and workshops to foster producer adoption.
- Evaluate the effectiveness and impact of the extension programming.

2. Brief description of the target audience

Grain and livestock producers, crop consultants, nutritionists and feed personnel, veterinarians, extension personnel, commodity groups, crop improvement associations, and grain processors.

3. How was eXtension used?

eXtension was of limited value to the Global Food Security and Hunger program. We averaged 1 question every 2 months on topics related to livestock nutrition and how to secure more livestock per unit of land (final output more food per unit of land).

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	641	25000	176	3000

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	7	39	46

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of additional acres grown with new NDSU developed crop varieties with improved disease resistance and the ability to produce a high quality crop under both favorable and marginal growing conditions.
2	Number of North Dakota livestock producers with increased knowledge of practices to improve the efficiency of livestock production systems, including use of improved livestock genetics, use of practices to improve reproductive efficiency, and use of improved nutrition.
3	Number of new NDSU developed crop varieties with improved disease resistance, the ability to produce a high quality crop under favorable and marginal growing conditions with educational efforts to enhance their adoption by producers.

Outcome #1

1. Outcome Measures

Number of additional acres grown with new NDSU developed crop varieties with improved disease resistance and the ability to produce a high quality crop under both favorable and marginal growing conditions.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of North Dakota livestock producers with increased knowledge of practices to improve the efficiency of livestock production systems, including use of improved livestock genetics, use of practices to improve reproductive efficiency, and use of improved nutrition.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	481

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Feed costs are a major component of overall production costs in cow/calf, growing, and finishing cattle systems. Improving the efficiency of feed utilization or using lower cost feeds, therefore, can have dramatic effects on profitability and sustainability of the beef industry. This research is aimed to improve the profitability of beef cattle production through improving efficiency of production and/or reducing input costs. Improving efficiency also has the potential to reduce the environmental impact of beef production systems. This research aims to improve efficiency of production through integrative research on nutrition, genetics, and reproduction of ruminants. These research objectives include both basic research to better understand physiological systems important in regulating feed efficiency as well as studies to examine the effects of different nutritional or management programs on performance in ruminants.

What has been done

Research projects were conducted on 1) the effects of limit-feeding and time of feed consumption (day vs. night) on growth performance in growing cattle, 2) the effects of forage source in finishing

cattle diets on feeding behavior and growth performance, and 3) economic and growth performance of late-season grazing annual forages designed to improve soil health characteristics (thus increased crop production for food security).

Results

The summarized research results are: 1) limit-feeding of a corn silage-based diet reduced average daily gain and cattle consuming feed in the evening tended to have increased ADG compared to cattle consuming feed during the day or half during the day and half during the evening, 2) including alfalfa, corn silage, corn stover, or wheat straw at similar NDF inclusion levels resulted in similar growth performance although cattle consuming corn stover and wheat straw spent more time eating per meal to consume a similar amount of DM, and 3) dual cropping marginal cropland that harvests crops grown for food followed by harvesting a second with livestock that are eventually harvested for food is more cost effective than a single cropping system or traditional drylot feeding when moisture conditions are average or greater. These results have provided information on changes in feeding management on growth and efficiency and increased our knowledge on how nutrition impacts feeding behavior which could result in feeding or management approaches that influence feeding behavior to enhance the efficiency of feed use in cattle. Results have been presented at extension and scientific meetings in ND and elsewhere.

4. Associated Knowledge Areas

KA Code	Knowledge Area
121	Management of Range Resources
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes
702	Requirements and Function of Nutrients and Other Food Components

Outcome #3

1. Outcome Measures

Number of new NDSU developed crop varieties with improved disease resistance, the ability to produce a high quality crop under favorable and marginal growing conditions with educational efforts to enhance their adoption by producers.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2013 2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Grain producers, crop consultants, Extension personnel, commodity groups, crop improvement associations, and grain processors.

What has been done
NDSU has developed new and improved germplasm in 14 crops, including some with multiple market classes. Improved germplasm has improved resistance to abiotic and biotic stresses. The improved germplasm also has improved end use quality that is desired by those who use and process the harvested seed.

Results
The flax line N06 2055 (CI3329/McGregor) was released as "Gold ND". ND06 2055 is a blue-flowered, yellow-seeded, high yielding yellow flax line with good oil content and oil drying quality. When averaged across all locations and years, N06 2055 yielded 8% more than the highest yielding named variety Carter and 18% more than the popular yellow seeded variety "Omega". The durum wheat line D04581 (Maier/D97643) was released as "Joppa". D04581 is a high yielding line, with excellent end use quality that has been tested in replicated yield trials since 2005. Averaged across all station-years of testing in the Uniform Regional Durum Nursery in Minnesota, Montana, North Dakota, South Dakota, and Canada, D04581 has out yielded all NDSU named cultivars. Test weight of D04581 is similar to that of Divide and Tioga. D04581 has a good disease-resistance package, including resistance to the prevalent races of leaf and stem rust, foliar disease scores lower than that of all cultivars except Grenora, and lower DON accumulation than all cultivars except Divide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

2013 was a good year for producers in ND. Weather extremes occurred at times that

had minimal impact on research and Extension programs. Public policy changes were minimal and government regulations were stable.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Surveys conducted by North Dakota State University Animal Sciences Extension Service showed over 17% of North Dakota livestock producers plan to add dual cropping systems to their livestock feeding operations within the next five years. This influx of dual cropping has the potential of impacting 2.3 million acres of cropland. This management technique has the potential of increasing pound of food per land area by 50 to 70% in 2 out of 3 years in the Northern Plains states. This increase in meat from livestock equates to 135 lb/ac using a dual cropping system. This is added income and food from the same land base.

Key Items of Evaluation