

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger - Enhancing prosperity of small farms.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources				25%
205	Plant Management Systems				8%
301	Reproductive Performance of Animals				8%
302	Nutrient Utilization in Animals				8%
303	Genetic Improvement of Animals				5%
304	Animal Genome				4%
307	Animal Management Systems				8%
601	Economics of Agricultural Production and Farm Management				9%
604	Marketing and Distribution Practices				22%
610	Domestic Policy Analysis				3%
	Total				100%

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	19.7
Actual	0.0	0.0	0.0	29.8

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	0	654527
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	621539
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	868193

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct field, greenhouse and laboratory research experiments on heirloom and medicinal crops. Germplasm evaluation, DNA analysis, cultivation method development. Generate a cDNA library for the guinea fowl. Develop chicken, guinea fowl and meat goat genetic resource populations. Use microArray to identify adipose specific transcriptome. Evaluate concentrate supplementation options for meat goat performance. Determine optimum floor space allowance for guinea fowl. Determine optimum requirement for dietary calcium and phosphorus by guinea fowl and determine optimum dietary requirement for methionine and lysine by guinea fowl. Conduct genetic and environmental research to enhance meat goat longitudinal doe performance, conduct producer workshops on assessing does for fitness and reproductive output. Hold focus group meetings to develop a comprehensive survey instrument for collecting data on the current situation and future prospects on various issues in small farm operations. Develop enterprise budget forms to collect data necessary to conduct economic analysis. Make results derived from analyses available to farmers to assist them to be economically viable. Develop brochures, fact sheets and other publications containing project results and distribute to stakeholders. Provide information to green industry and related sub-sector service providers at special events such as trade shows and field days.

2. Brief description of the target audience

Small farmers, agricultural research community, crop producers, plant breeders, retailers of vegetable and ornamental plant seeds, Extension agents, policy makers, homeowners, medicinal plant industry, landscape businesses, consumers of green industry products and services, meat goat industry, Guinea fowl and poultry industries.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	0	0	0	0
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
Plan: 0
Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	0	7	
Actual	0	7	7

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Development of new Goldenseal cultivars.
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Development of microproagation techniques for high berberine/hydrastine yielding cultivars of Goldenseal.
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Establishment of demonstration areas for improved cultural practices of Goldenseal.
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Cost analysis for Goldenseal production.
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Evaluation of livestock management techniques for economic feasibility.

Year	Target	Actual
2010	1	1

Output #6

Output Measure

- Development of chicken, Guinea fowl and meat goat genetic resource populations.

Year	Target	Actual
2010	1	1

Output #7

Output Measure

- Construction of cDNA library for Guinea fowl.

Year	Target	Actual
2010	1	3

Output #8

Output Measure

- Dietary recommendations to guinea fowl producers for optimal production.

Year	Target	Actual
2010	1	1

Output #9

Output Measure

- Technique to determine optimal nutrient composition of guinea fowl diet.

Year	Target	Actual
2010	0	0

Output #10

Output Measure

- Number of techniques to improve productivity and longevity of meat goat does.

Year	Target	Actual
2010	1	1

Output #11

Output Measure

- Number of meat goat producers participating in doe record keeping.

Year	Target	Actual
2010	30	40

Output #12

Output Measure

- Average increase per herd of reproduction-based doe retention rate.

Year	Target	Actual
2010	1	1

Output #13

Output Measure

- Policy papers relating to the economic viability of small farmers.

Year	Target	Actual
2010	1	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of additional producers with increased knowledge of varieties, attributes and growing practices of heirloom varieties.
2	Additional number of consumers with increased knowledge of attributes of heirloom varieties.
3	Additional number of students gaining knowledge of heirloom variety characteristics.
4	Number of DNA profiles developed to facilitate marker-assisted breeding.
5	Number of graduate students trained in DNA based plant characterization techniques.
6	Number of protocols for DNA characterization to establish true-to-type identification of varieties.
7	Number of significant functional elements (such as amino acids and vitamins) characterized in heirloom varieties.
8	Number of improved Goldenseal cultivars released.
9	Number of techniques defined for improved Goldenseal production.
10	Increase in number of producers with an increase in exports of nursery products and producers' income.
11	Increase in number of producers with increased sales and income.
12	Increase in number of producers receiving assistance in decreasing knowledge gaps, marketing and market access.
13	Increase in number of producers with increased knowledge of exports potential and opportunities by producers.
14	Increase in number of producers with increased awareness of alternative crops.
15	Increase in number of producers adopting alternative crop production.
16	Increase in number of producers with increased farm diversification.
17	Number of adipose-specific genes identified in alternative poultry species.

18	Number of alternative poultry birds examined in genetic resource population.
19	Number of meat goats screened for genetic markers.
20	Percentage of Guinea fowl producers realizing savings in feeding costs.
21	Percentage of producers implementing recommendations for optimized Guinea fowl production.
22	Percentage of Guinea fowl producers realizing profitability after adoption of recommendations.

Outcome #1

1. Outcome Measures

Number of additional producers with increased knowledge of varieties, attributes and growing practices of heirloom varieties.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Additional number of consumers with increased knowledge of attributes of heirloom varieties.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Additional number of students gaining knowledge of heirloom variety characteristics.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of DNA profiles developed to facilitate marker-assisted breeding.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Molecular markers are excellent tool for true to type identification of authentic plant material to ascertain their genuineness. AFLP is a tool of choice since its reliability is based on two molecular techniques i.e., restriction digest and DNA amplification.

What has been done

Six tomato (Andrew Rahat Jumbo, Brandy Wine, Brimmer, Marizol Red, Russian & Tidwell German) and nine pepper (Anaheim, Cayenne, Cowhorn, Cubanelle, Habanera, Poblano Ancho, Red Bell, Serrano & Tabasco) heirloom varieties were analyzed using AFLP markers.

Results

To facilitate DNA-fingerprinting for true-to-type identification of heirloom tomato and pepper varieties automated DNA analysis system of Li-Cor (Lincoln, NE) was used. More than 300 molecular markers were produced to distinguish each tomato and pepper variety, using 20 dual-dye (IRD-800 and IRD-700) AFLP primer pairs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #5

1. Outcome Measures

Number of graduate students trained in DNA based plant characterization techniques.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Molecular markers are excellent tool for true to type identification of authentic plant material in order to ascertain their genuineness. AFLP is therefore a tool of choice since its reliability is based on two molecular techniques i.e., restriction digest and DNA amplification.

What has been done

One graduate student and two pre-college summer student interns were trained in the procedures of leaf sample collection, gel-electrophoresis, DNA extraction, AFLP analyses, Sequencing gel-analysis, and the use of bioinformatic tools for marker based genetic analyses.

Results

The pre-college (11th and 12th grade) student summer interns trained were inspired by the training received and showed their interest to choose TSU for college education. The 12th grader did join TSU and returned to PI's lab for undergraduate training.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #6

1. Outcome Measures

Number of protocols for DNA characterization to establish true-to-type identification of varieties.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Molecular markers are excellent tool for true to type identification of authentic plant material in order to ascertain their genuineness. AFLP is therefore a tool of choice since its reliability is based on two molecular techniques i.e., restriction digest and DNA amplification.

What has been done

The six tomato (Andrew Rahat Jumbo, Brandy Wine, Brimmer, Marizol Red, Russian & Tidwell German) and nine pepper (Anaheim, Cayenne, Cowhorn, Cubanelle, Habanera, Poblano Ancho, Red Bell, Serrano & Tabasco) heirloom varieties were analysed using AFLP markers.

Results

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4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #7

1. Outcome Measures

Number of significant functional elements (such as amino acids and vitamins) characterized in heirloom varieties.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Peppers and tomatoes are among the top vegetable species consumed in the United States. Consumers are interested in knowing the nutritional value, especially the functional elements contained in these plants. Providing this knowledge to the public will assist in promoting a healthy diet.

What has been done

Elements have not been identified yet.

Results

Elements have not been identified yet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #8

1. Outcome Measures

Number of improved Goldenseal cultivars released.

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Number of techniques defined for improved Goldenseal production.

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Increase in number of producers with an increase in exports of nursery products and producers' income.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	20	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Nursery business owners are interested in the general performance of the sub sector to ensure profitability. This applies both to the domestic and export markets. Volatility in exports is related to a number of issues including transaction costs and regulations. From the vantage point of nursery exporting businesses there is need to ensure stability in income.

What has been done

A mail survey was used to gauge the key issues of trade, regulations and transaction costs. The latter represents costs that are incurred to carry out a transaction both prior to and after sale pertaining to search, bargaining and contracting as well as monitoring cost. Business owners strive to minimize transaction costs to acquire adequate income.

Results

Analysis of the data revealed that sanitary and phytosanitary regulations and lack of knowledge about trade legislation and associated policy parameters in the countries to which products are exported represent key sources of transaction costs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
610	Domestic Policy Analysis

Outcome #11

1. Outcome Measures

Increase in number of producers with increased sales and income.

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Increase in number of producers receiving assistance in decreasing knowledge gaps, marketing and market access.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	75	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Access to relevant information that will enable business operations to fully participate in the market place is crucial. Close examination of this issue is important to understand their competitiveness. Landscape businesses are an important component of the nursery and greenhouse business. They provide a wide range of services including landscape and turf grass maintenance as well as plant installation.

What has been done

A survey of landscape businesses in the Nashville area was conducted to acquire feedback on operations of the businesses, including their size, gap in knowledge about the business, opportunities and challenges. It is important to get an understanding of the above issues to assess how well the businesses are doing.

Results

It was found that landscape services are very closely linked to nursery businesses. They range in size from small to large. Labor availability, weed suppression, water supply and pest regulations are noted to be major problems. Services provided by landscape businesses include landscape and turf maintenance as well as plant installation.

Results of the survey provide insights on a number of issues relating to landscape businesses.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #13

1. Outcome Measures

Increase in number of producers with increased knowledge of exports potential and opportunities by producers.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	50

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increase in knowledge of export potential and opportunities for producers will enable businesses to enter the international market thereby expanding their market base and associated income.

What has been done

Data on nursery exporting businesses was acquired from the Tennessee Department of Agriculture covering a few years. This was the best available data at this time that could be used to assess the trend in knowledge of nursery products export potential that will benefit businesses.

Results

A review of nursery exports from Tennessee indicated that only few businesses were engaged in pursuing export opportunities. This may be due to a number of reasons including differences in the level of knowledge about export potential among nursery business owners. This difference could persist as long as there is no information shared among businesses. The existence of asymmetric information limits knowledge about export opportunities and potential income that could have been obtained.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #14

1. Outcome Measures

Increase in number of producers with increased awareness of alternative crops.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	100	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Small farmers have been facing a number of challenges over the years in different areas. The key challenge for small farmers has been maintaining adequate level of income. Changing policies, development of new technologies, globalization and increasing concentration in agriculture have compounded the challenge. Given that small farmers account for over 93 percent of all farms in the United States, the issue is a concern at the community, regional and national levels. One recent policy change involves tobacco, which no longer receives government support. This calls for increased awareness about alternative enterprises to secure a source of income replacing tobacco.

What has been done

A comprehensive mail survey was used to gather data on various issues. Farmers were selected from a database provided by the Farm Service Agency. This provided insights that could be used to enhance the viability of small farmers. Presentations were made at various conferences such as the National Small Farm Conference and annual Tennessee State University Small Farm Expo. Pigeonpea, an alternative niche crop, was being introduced to farmers by getting them to plant it in their fields and by setting up demonstrations on Tennessee State University Research Stations. The benefit of adopting the crop has also been presented at regional meetings attended by diverse stakeholders.

Results

Over two third of the farmers indicated business climate is getting worse with challenges in the areas of finance, farm labor availability and marketing. Survey results show very few responses to

the issue of awareness about alternative enterprises. A significant number of the respondents indicated that they have not participated in any training workshops.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices

Outcome #15

1. Outcome Measures

Increase in number of producers adopting alternative crop production.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	15	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adopting alternative enterprises by small farmers has become critical with the changing policies and conditions in the market place characterized by competition. This is the case both in the domestic and global markets. Farmers should be familiar with measures that will reduce cost and enhance their return.

What has been done

As part of the comprehensive mail survey mentioned earlier, farmers were asked two questions pertaining to adoption of alternative enterprises. First, whether or not they had adopted any alternative enterprises, and second how profitable the products were in comparison to profit that they used to get from tobacco. This was aimed at understanding what options farmers were pursuing and the associated level of profitability.

Results

Ninety one percent of the respondents indicated that they did not raise tobacco since the buyout in 2005. Despite this response, adoption of alternative enterprises had not yet taken root. It required demonstrating economic viability of alternatives to farmers. This suggested that adoption of alternative enterprises would take effort and time to implement.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
604 Marketing and Distribution Practices

Outcome #16

1. Outcome Measures

Increase in number of producers with increased farm diversification.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	15	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farm diversification is an important risk management tool. With increasing globalization and change in government regulations, diversification has become critical to avoid volatility in producer prices and crops.

What has been done

A number of alternative crops are considered, ranging from legumes such as pigeon pea to vegetables along with marketing channels.

Results

While the importance of diversification is recognized, transition requires producers to take risk to move to new crops and new enterprises. There is an aversion to risk that may be slow to change.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
604 Marketing and Distribution Practices

Outcome #17

1. Outcome Measures

Number of adipose-specific genes identified in alternative poultry species.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	25	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Identification of adipose specific genes /loci will facilitate selection of leaner birds.

What has been done

cDNA libraries of the hypothalamus, liver, and pancreas of the Guinea fowl were constructed and screened.

Results

We are below our target number for this outcome. Large populations are required and since this is an ongoing effort more genes will be identified. Genes that may be responsible for excessive fat deposition were identified.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals

Outcome #18

1. Outcome Measures

Number of alternative poultry birds examined in genetic resource population.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	200	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Excessive fat deposition is liability to the poultry industry.

What has been done

Pureline populations were evaluated for body weight gain and fat deposition. These populations were also evaluated for copy number variation.

Results

Target was not met due to mortality. This efforts will be continued since large populations will be required to identify adipose specific genes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
304	Animal Genome

Outcome #19

1. Outcome Measures

Number of meat goats screened for genetic markers.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	40	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Goat producers in the Southeast United States are facing animal fitness problems. Better breeding stock suited to the environment would help alleviate some of these problems.

What has been done

This research has been temporally suspended due to historic flooding this spring that wiped out the herds.

Results

This research has been temporally suspended due to historic flooding this spring that wiped out the herds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
304	Animal Genome

Outcome #20

1. Outcome Measures

Percentage of Guinea fowl producers realizing savings in feeding costs.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	50	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The costs associated with the production of Guinea fowl need to be minimized for producers to realize maximum profit as this species becomes more accepted in American diets.

What has been done

Requirements for calcium and phosphorus for the Pearl Gray guinea fowl layer were determined and communicated to stakeholders via scientific, popular, and grower target publications and presentations.

Results

Findings were communicated through publication and directly to the guinea fowl breeders association (GFBA). We are not able to definitively quantify the number of producers reached through print media, but GFBA comprises over 25% of producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #21

1. Outcome Measures

Percentage of producers implementing recommendations for optimized Guinea fowl production.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	90	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Implementation of recommendations of optimum floor space and calcium and phosphorus requirements will decrease the cost of production of guinea fowl.

What has been done

Floor space, calcium, and phosphorus requirements have been determined and communicated to producers.

Results

Assessment of adoption of recommendations has not been completed yet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
307	Animal Management Systems

Outcome #22

1. Outcome Measures

Percentage of Guinea fowl producers realizing profitability after adoption of recommendations.

2. Associated Institution Types

- 1890 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	80	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Adoption of recommended floor space, calcium, and phosphorus requirements can increase profitability of Guinea fowl production.

What has been done

Optimal floor space, calcium and phosphorus requirements have been determined and communicated to producers.

Results

Cannot verify those reached by print and online publications, but research findings were communicated to the Guinea Fowl Breeders Association constituting more than 25% of guinea fowl producers. Assessment of profitability has not been completed yet.

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
307	Animal Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Floods)

Brief Explanation

Much of the animal research was affected either directly or indirectly by the historic floods that occurred in metropolitan Nashville during the spring of 2010. The goat programs were particularly hard-hit, with hundreds of goats being lost. Other service interruptions affected other research programs as well.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}