

**Introduction:**

Located in south-central Montana, the Crow Reservation is approximately 2.3 million acres in size. The Reservation has a membership of approximately 11,000 people and was established in 1883.

Obesity and type 2 diabetes rates continue to soar and poverty remains to be a barrier to healthy living (O'Connell, 2011). Francesca Pine (Photos 6, 8) has started the Greenhouse and Garden Project (Photos 5-9) on the reservation in affiliation with Little Big Horn College. She hopes to provide knowledge of home-growing methods that will have long lasting impacts on the economic and health situations of Apsalooke living on the reservation.

We hypothesized that a recipe book provided to residents of the Crow Nation will improve nutrition through appealing presentation of healthy recipes including vegetables grown in the community garden. We further hypothesized that the knowledge of how to cook with these vegetables will increase the number of backyard gardens in the Reservation communities leading to improved economic well being and physical health of the residents.

**Materials & Methods:**

We traveled to the Crow Agency on February 29th to meet Francesca and gain first hand knowledge about the Green House project and community health issues. After a series of discussions, we determined Francesca needed assistance with community outreach projects and decided to create a recipe book and conduct a sensory evaluation of recipes chosen for the book.

A sensory evaluation (Photos 1-4) of likeability of recipes was held with members of the Crow community on the Food Lab (Herrick Hall) on the campus of Montana State University. Three recipes chosen from the cookbook were: strawberry & spinach salad, roasted cherry tomatoes with cornbread crumbs, and carrot cake with cream cheese frosting. Recipes were evaluated for: Appearance, Odor, Taste, Texture, Overall Likeability. Eight Apsalooke members participated.

(Photo 1) Location of evaluation



(Photo 3) Portions of dish to be evaluated

(Photo 2) Place setting with palette cleanser



(Photo 4) Participants and researchers



**Results & Discussions:**

Post-tasting data showed that all participants enjoyed the dishes served and that the event would change how frequently most of them would cook with vegetables (Table 1). Dish 3 was the favorite, followed by Dish 1, followed by Dish 2 shown by total score (Table 2). Participants stated that it was difficult for them to obtain good quality, fresh produce citing the lack of availability in reservation stores as a reason for this deficit (Table 3). Data from the sensory panel indicated the hypothesis has a good chance of being correct (Table 3).

It was surprising to learn that the average number of times vegetables were consumed per week by participants was 3-4 (Table 4). This is far below the recommended 5 servings per day (Birmingham 2004).

# Increasing Awareness of Healthful Nutrition on the Crow Reservation Through Vegetable Cultivation and Consumption Using a Compiled Recipe Book

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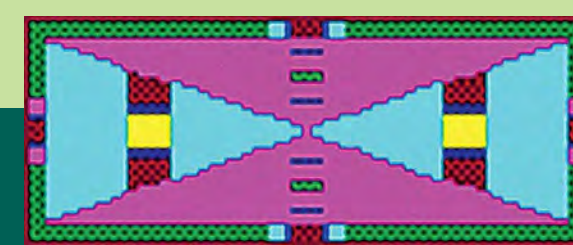


Photo 5

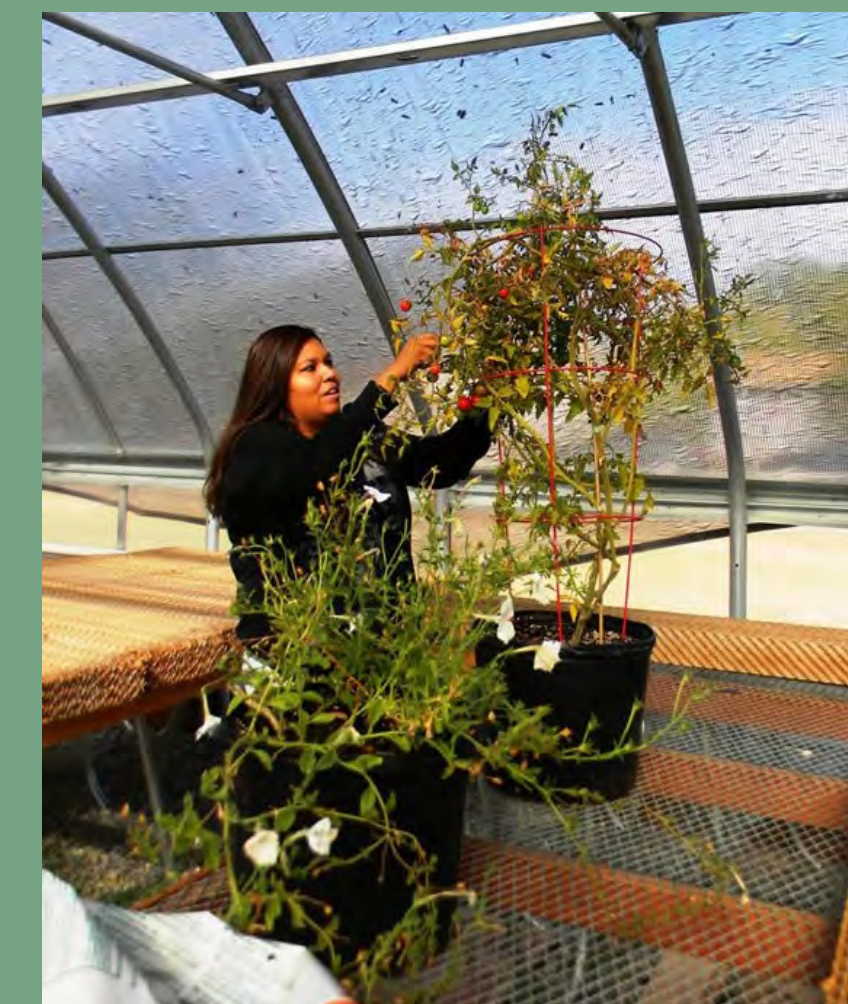


Photo 6



Photo 7



Photo 8



Photo 9

**Acknowledgements**

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- The Crow Nation
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- Melody Anaker & Alison Harmon
- Participants of the Sensory Evaluation Panel
- Jason Myers
- Jeff Cahill & Henry Vinson
- Adam Pohl

**Recommendations**

These are recommendations we have for future researchers, members of the Crow Nation, or anyone else interested in continuing this project.

- Hold future tasting panels and cooking demonstrations to increase awareness of food issues
- Survey after recipe book distribution to determine effectiveness at maximizing produce consumption
- Design an improved Greenhouse and Garden Project brochure with logo for project
- Create signage display for front of greenhouse
- Continue researching effective community outreach and its relation to food

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**Data Collected:**

Table 3

Response to "How do you feel about eating vegetables now?"	Response to "If it's not easy for you to access fresh quality produce, explain"	Response to "What are your thoughts on a cookbook using vegetables?"	Suggestions for the cookbook
I like it	I live in a shack, but there is the amish store in the fall I can go to	would like it	combine with wild meat
I have always liked them, just hope to try more	Living on the reservation, you never do	I would enjoy that	instead of just a can of veggies look at healthy recipe
I like veggies	Local stores on the res don't always have fresh produce	for sure	include all superfoods: avocado, spinach, quinoa, lentils, etc.
good (2 responses)	at the store it depends on what's in stock	good	it'd love to learn how to make eggplant parm
know how to cook with veggie, before only as side	The store locally has veggie, but mostly go to Costco	great idea	no response
Same	Produce selection in Lodgegrass is horrible	yes	its going to be awesome
Don't love them	no response	no response	no response
no response	no response	no response	no response

Table 2

Dish	appearance	texture	taste	odor	likeability	total score
Dish 1	8	9	9	10	10	46
9	9	8	7	8	41	
10	8	9	9	10	46	
10	10	10	10	10	50	
10	10	10	10	10	50	
8	9	9	8	9	43	
10	10	10	8	10	48	
10	8	9	10	9	46	
total	74	72	74	71	76	367
mean	8.22	9	9.25	8.9	9.5	45.88
Dish 2	8	7	9	8	9	41
8	8	10	8	9	43	
9	8	9	9	9	44	
5	10	9	10	9	43	
5	5	5	5	5	25	
8	8	9	9	9	43	
5	5	6	8	5	29	
10	10	10	10	10	50	
58	61	67	67	65	318	
total	7.25	7.63	8.38	8.4	8.13	39.75
Dish 3	10	9	9	10	10	48
10	7	9	10	8	44	
10	9	8	9	9	45	
10	9	9	10	10	48	
10	10	10	10	10	50	
7	7	7	7	7	34	
10	10	10	10	10	50	
10	10	10	10	10	50	
10	6	6	10	8	42	
total	87	77	79	86	82	411
mean	17.4	8.56	8.78	9.6	9.11	45.67

Table 4

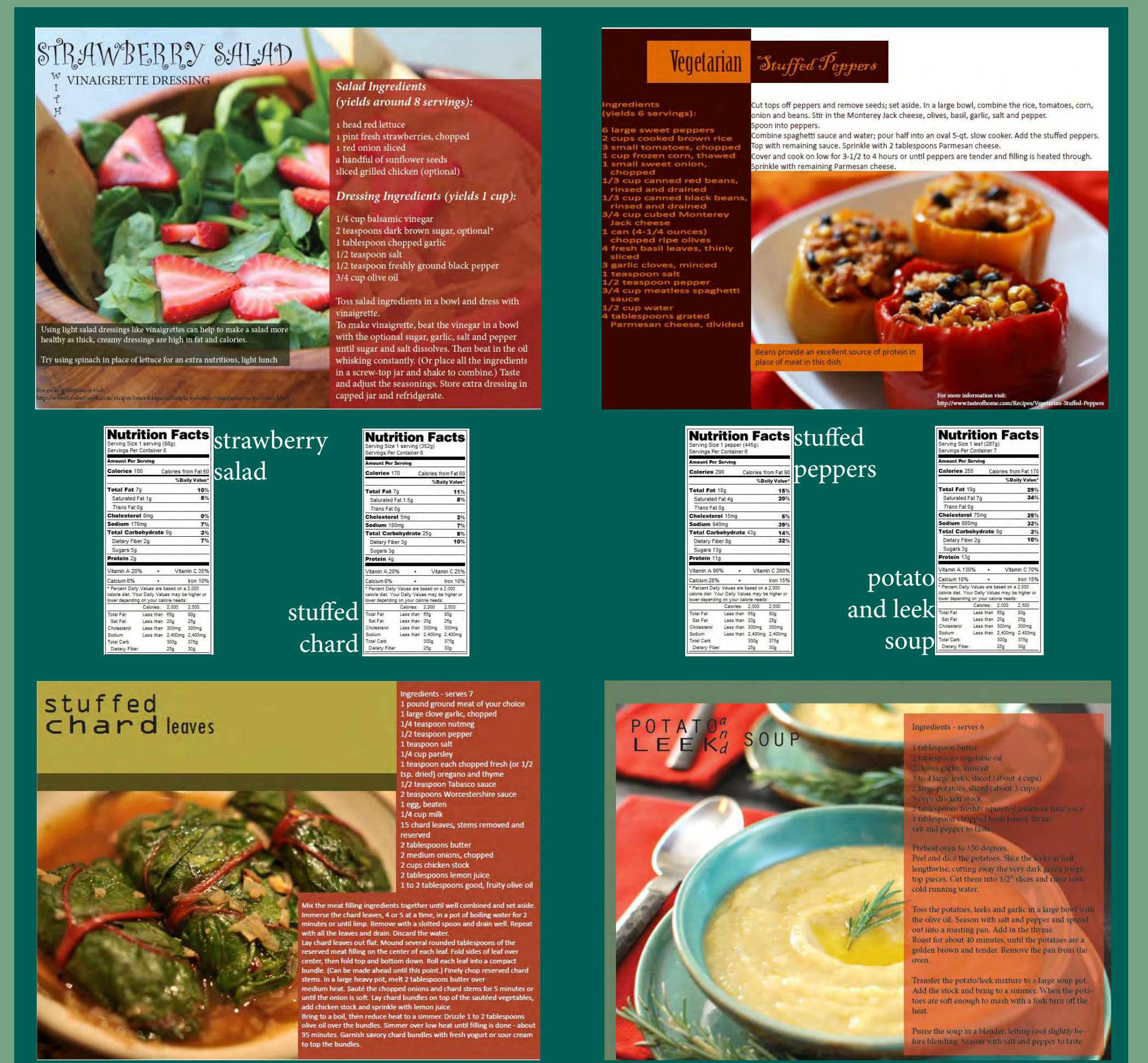
Demographic of Sensory Evaluation Participants	Response
Gender	80% F 20% M
Age	mean: 35.8 yrs median: 28 yrs range: 23-62 yrs
Times per week vegetables eaten (mean)	3.5
Do you like vegetables?	100% answered yes
Do you cook with vegetables?	100% answered yes
If yes, how many times per week (mean)	3.5
Additional written responses:	"not as much as I'd like" "Sometimes, sometimes raw"

Table 1

Question	Yes	Maybe/strange	No	Other
Will this event change how frequently you cook with	7	0	0	1
Is it easy for you to get good quality fresh produce?	5	1	1	1
Are you interested in learning how to grow your own food?	2	0	3	3
Are you interested in learning how to?	4	0	3	1
Would you find a cookbook useful?	6	1	0	1
total	87	77	79	86
mean	17.4	8.56	8.78	9.6

Participants in the sensory evaluation may not constitute a representative population of Apsalooke living on the reservation. This is due to the fact that only 25% of participants resided within Crow reservation boundaries. Discussions with participants revealed that at least 50% of participants possessed a level of education above the average found on the reservation. Therefore it may not be appropriate to use this data to represent the Crow Nation in its entirety.

Information gathered from the sensory evaluation influenced the recipe selection for the book. The evaluation gave us a better understanding of the foods that Apsalooke have access to and enjoy eating. The book is comprised of roughly 25 recipes (Figure 1). Recipes provide innovative ways to prepare fresh produce and are based off of the crops being produced in the garden at Little Big Horn College. Each crop has at least one corresponding recipe that instructs on preparing and cooking the given produce. Recipes have been carefully selected for their healthfulness with attention to ingredient accessibility. We also analyzed the nutritional composition of each recipe using Nutritionist Pro software.



(Figure 1)