

Which Gourd Type Do  
Purple Martins Prefer?

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## Abstract:

The purpose of this experiment was to compare between Purple Martin nesting styles, in two house types: the Carroll gourd and the Natureline gourd. The hypothesis for this experiment was that gourd type would be significant in terms of occupancy rate and the weight of nestlings. Data was collected on the number of eggs, number of nestlings in each brood, hatch date, age of parents, entrance type, pole height, and pole direction. Weekly nest checks for eggs and nestlings were performed. At an age of 11-21 days, nestlings were banded and weighed.

It was found that the martins preferred the Natureline gourds to the Carroll gourds. Martins in Natureline gourds hatched earlier, but did not show a significant weight difference at banding. Total brood size was comparable between Natureline and Carroll gourds, but the difference was not significant. Both pole height and direction of the gourds were not shown to effect preference or nest success. Possible extensions include adding more gourds, assigning more types of gourds to the study, and collecting and analyzing temperature data daily using HOBO temperature sensors.

## Introduction

The Purple Martin (*Progne subis*) is the largest North American swallow, measuring 7-½ in. long and weighing 1.9 ounces. They are placed in the Hiruninidae Family.

Adult Purple Martin males have glossy purple-black plumage. An adolescent male (less than 3 years of age) is only partially purple and is often mistaken for a female martin. The young females appear to be mainly brown with a slight purple color to their plumage. Adult females have more purple in their plumage, but are not as dark or as fully colored as an adult male.

Purple Martins spend their breeding season in North America and their non-breeding season in Eastern South America. Purple Martins in Eastern North America have become totally dependent on human provided housing. In Western North America they tend to nest without human intervention.

Purple Martins form a monogamous and cooperative bond at the beginning of each breeding season. The male and female both participate in constructing the nest from mud, twigs, and grass. The female lays eggs at a rate of about one per day, she will lay between 2 and 7 eggs. After the eggs hatch, both parents participate in feeding the nestlings continuously for 26-32 days until the nestlings are of age to fledge. The young are still dependent on their parents for food and training for 1 to 2 weeks after they fledge. Most fledglings return to roost in the same housing during this time period.

Purple Martins are aerial insectivores. As such they are sensitive to extreme weather conditions. If bad weather is persistent, it can cause a decline in insect population. If this happens Purple Martins will begin to starve. If the temperature is over 105° F. for series of days, nestling martins can perish from overheating.

Hanging Purple Martin housing (gourds) was originally a practice performed by Native Americans. The Purple Martins were appreciated because they kept crows away from Native American crops. Over time, this custom was copied by Europeans and passed down. In modern times, Purple Martin gourds are manufactured from plastic for people to hang around their houses and property. At John Jay High School, two types of manufactured gourds are being used, the Carroll gourd and the Natureline gourd.

The Carroll gourds measure 8 in. in diameter and are spherical. The Natureline gourds measure 11 in. in diameter, are elliptical, and have a removable entrance. The removable entrances of a Natureline gourd are designed to be interchangeable so as to give people with European Starling or House Sparrow problems a way to keep them out of Purple Martin housing. One of the key factors of a well-designed Purple Martin gourd is that it should be capable of opening for easy cleaning and the changing of nesting materials.

As we practice nest colony maintenance suggested by The Purple Martin Conservation Association, such is vital to having a successful Purple Martin Colony. It is suggested that the following are performed: weekly nest checks, nesting material changes, daily “walk-unders”, and keeping written records of everything that happens in your colony.

## Purpose:

The purpose of this project was to determine whether there was either a preference or a nestling weight advantage between Natureline and Carroll gourds.

## Hypothesis:

It was hypothesized that Natureline gourds, which are larger than the Carroll gourds, will have a higher occupancy rate and will produce heavier nestlings.

## Null Hypothesis:

The null hypothesis was that neither gourd type would have a higher occupancy rate or produce heavier nestlings.

## Materials:

Existing Purple Martin Colony w/ Nesting Activity

15 Plastico Natureline Purple Martin Gourds

10 Carroll Industries Purple Martin Gourds

5 Plastico Round Entrances for Natureline Gourds

6 Plastico Obround Entrances for Natureline Gourds

4 Plastico Crescent Entrances for Natureline Gourds

4 Telescoping Metal Poles setup for Purple Martin Gourds

25' Measuring Tape

Purple Martin Bird Bands

Bird Banding Tool

Electronic Scale (measuring in grams)

## Procedures:

At the school campus an active Purple Martin colony has been maintained for seven years. During the 2003 breeding season, the different gourd types were checked weekly for eggs and nestlings as a part of regular colony maintenance. Data was also collected on the weight of nestlings in an age range of 11-20 days old. Weight data was collected using a scale provided by a licensed fish and game bander. All data collected was recorded and subjected to statistical analysis.

The Purple Martins were offered two gourd types during the 2003-breeding season: 15 Natureline gourds and 10 Carroll gourds. The gourds were not hung in any specific order, but were not a blind random orientation.

When the nestlings were approximately 11 to 20 days of age they were banded by a licensed fish and game bander. While the birds were being banded, they were weighed.

## Tables:

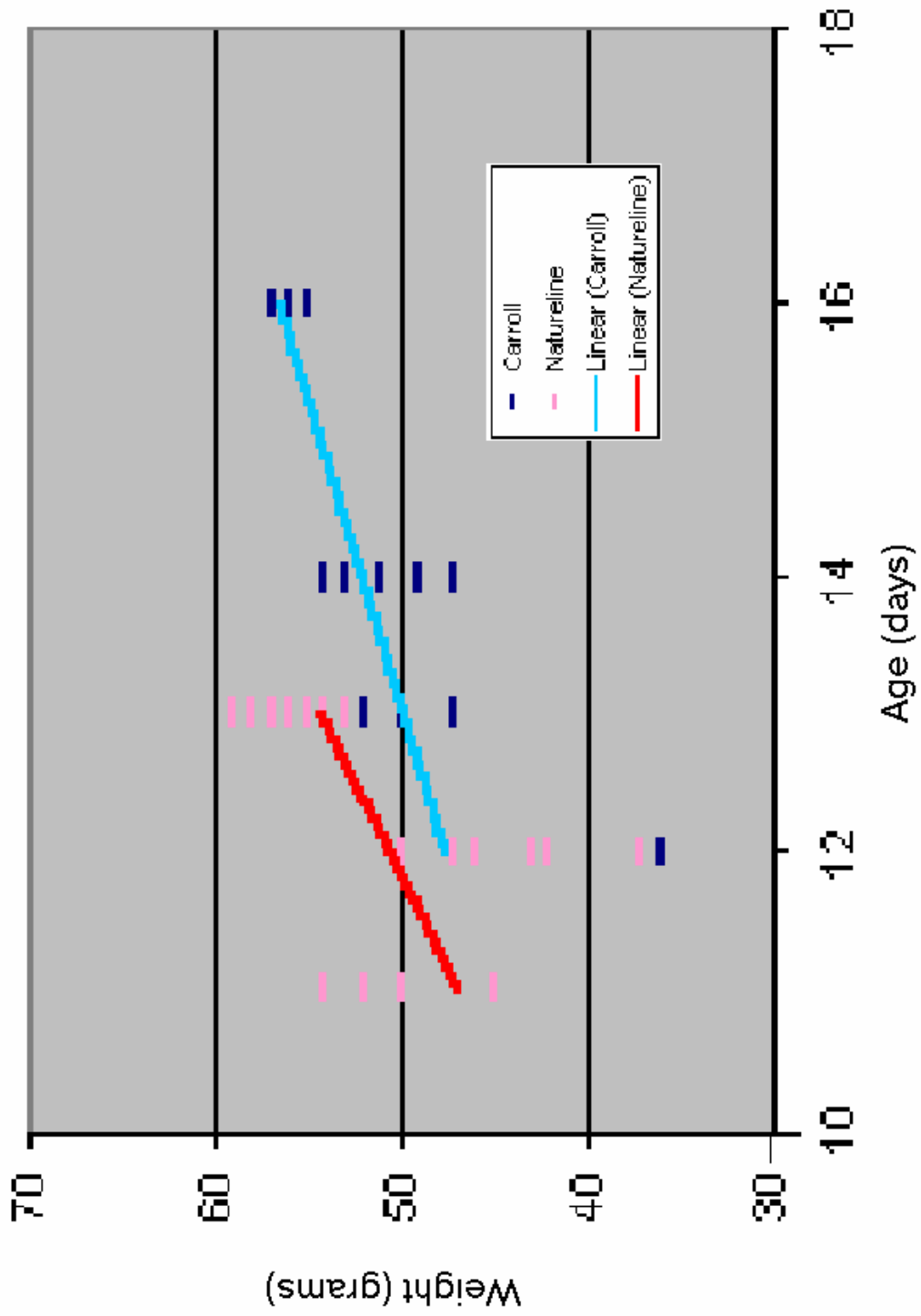
### Purple Martin Use of Gourd Types

	Carroll	Natureline	P-Value
Occupancy Rate	70%	87%	--
Egg Hatch Date	121	118	3.51E-07
Brood Size	5.14	4.62	0.3
Weight of Nestlings	51	51.381	0.811

### Comparison of Gourd Entrances

	Entrance Type		
	R	O	C
Number of Each	5	6	4
Occupancy Rate	80%	83%	100%
Egg Hatch Day	118.7	117.26	117.87
Brood Size	5.4	4.65	4.76
Nestling Weights	51.7	56.48	51.06

# Scatter Plot; Nestling Weight vs Age



## Results:

In all, there were 96 young hatched and fledged from 20 gourds; there were no known deaths. Seven of these gourds were Carroll gourds and thirteen were Natureline gourds, with a total of 36 young in the Carroll gourds and 60 young in the Natureline gourds.

There were 5.1 nestlings per brood in the Carroll gourds and 4.6 nestlings per brood in the Natureline gourds, when examined, these numbers were found to relate insignificantly ( $p > .05$ ).

It was found that the occupation rate was higher in Natureline gourds (13/15, 87%) than in Carroll gourds (7/10, 70%). The average pole height was 172 inches in Carroll gourds and 165 inches in Natureline gourds. With regard to the occupancy rate, this might suggest that the Purple Martins preferred the lower level of housing.

The hatch date of the young ranged from March 24, 2003 to as late as May 5, 2003. The young in the Natureline gourds hatched significantly ( $p < .05$ ) earlier (3 days) than the young in the Carroll gourds. This indicates that the nesting cycle started earlier in the Natureline gourds than in the Carroll gourds.

The study measured weights of nestlings between 11 and 16 days of age. To minimize the nest disturbance, nestlings were only weighed when a licensed bander was present. Consequently, some nestlings could not be weighed within the 11 to 16 day time frame. Although these nestlings were weighed as soon as possible after the 11 to 16 day window, weight results from those nestlings were excluded from the weight study to prevent skewing of the data. Of the 96 total nestlings, 52 were included in the weight study. The data analyzed included 31 nestlings from 6 Carroll gourds (avg. age 13.6 days) and 21 nestlings from 4 Natureline gourds (avg. age 12.25days). The average weight of the Natureline gourd nestlings (51.381g) was found to be insignificantly ( $p > .05$ ) more than that of the Carroll gourd nestlings (51g).

## Conclusion:

It was found that the martins preferred the Natureline gourds to the Carroll gourds. Martins in Natureline gourds hatched significantly earlier, but did not show a significant weight difference at banding. Total brood size was comparable between Natureline and Carroll gourds, but the difference was not significant. Both pole height and direction of the gourds were not shown to effect preference or nest success. Possible extensions include adding more gourds, assigning more types of gourds to the study, and collecting and analyzing temperature data daily using HOBO temperature sensors.

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