TESTIMONY OF

DR. MARCO PALMA

Pecan Federal Marketing Order Hearing

Docket No. AMS-FV-15-0023; FV15-986-1

Western Region – Las Cruces, New Mexico - July 20 and 21, 2015

Good morning! My name is Marco Palma. It is spelled M-A-R-C-O P-A-L-M-A. My current address is 5210 Cascades Dr. College station, Texas, 77845. I have a PhD in Agricultural Economics from the University of Florida. I am Associate Professor and Extension Economist in the Department of Agricultural Economics at Texas A&M University. I am the horticulture marketing specialist with responsibilities for leadership and coordination for extension educational programs and applied research in horticultural marketing by providing technical expertise and educational program development for industry audiences, such as producers, packers, and shippers, wholesale and retail trade. My major areas of research expertise are experimental and behavioral economics, discrete choice methods and consumer preferences. I have worked in many different areas of consumer research, including promotion programs as evidenced in the attached CV.

As you can see I have made numerous presentations related to pecan marketing and economics, as well as publications related to consumer economics and promotion programs for many agricultural products including pecans. Most recently, and for the benefit of this public hearing and in support of the Proponent group, I have prepared a report relevant to this hearing today entitled "Economic Analysis of the Implementation of a Federal Marketing Order for Pecans" (referred to as "the report") a copy of which has been delivered for inclusion in the record of this hearing. My education and experience give me the necessary tools to make an expert assessment of the economics of establishing a Federal Marketing Order for Pecans.

I will provide you with a summary of the report and then open it for questions. When I refer to a Table or Figure, I a referring to them as shown in the report.

This report has been compiled to provide an economic assessment of the proposed Federal Marketing Order (FMO) for pecans. For clarity purposes the narrative is arranged in two main sections: Section I describes the current economic and marketing state of the pecan industry using available secondary data. Section II describes the costs and benefits of the proposed federal marketing order based on the data presented in Section I and additional input from industry key stakeholders.

I am skipping the Executive Summary, since it summarizes Section II which I will be covering.

Section I: Economic Framework of the Pecan Supply and Demand

Beginning on page 10 of the report.

A. World Pecan Supply

The pecan (*Carya illinoinensis*) is a perennial tree native to North America and produced extensively throughout the southern region of the USA and the northern portion of Mexico. There are hundreds of pecan varieties around the world which can be classified as *native/seedling* or *improved* varieties (Thompson and Young 1985). The majority of the improved varieties have been developed by grafting, with the first grafted trees being sold in the 1880s (Wells and Conner 2007) and a large growth in the commercial planting in the early 1900s.

The pecan tree can produce for over 300 years once it passes the first six to seven years to initiate production in the case of grafted trees or ten to twelve for native/seedling varieties. Native/seedling varieties are those that occur in natural propagates or seed planted orchards on trees that have not been grafted. Improved varieties are grafted trees. Pecan trees exhibit a peculiar production behavior known in horticulture as masting (Chung, Harris, and Storey 1995). This condition entails that the plant will produce a very high yield one year, usually referred to as "on" years, followed by a low yield year, commonly known as "off" year.

This alternate bearing nature in pecan production has naturally produced a cyclical behavior as well in the pecan prices, with an inverse relationship: high prices in off years and low prices in on years.

The entire production of pecans in the world is not exactly known. In the past it had been estimated that the US production comprised over 80% of the world's supply (Onunkwo and Epperson 2000). However, based on current trade and consumption of pecans in the world from the International Nut and Dried Fruit Council (2015), the US production is roughly about 59% of the entire world production. The second largest producer of pecans is Mexico with over 35% of the world production. Minor pecan production takes place in Australia, South Africa and South America, including but not limited to Argentina and Peru as shown in Figure 2 of the report.

B. U.S. Pecan Trade

International trade of pecans is done in-shell and in kernel (shelled). The US is the world leader of in-shell pecan exports, exporting mainly to China with an average of 23.7 million pounds per year between 2009 and 2013 (USDA-ERS 2014). The other main importers of US pecans in the shell are Vietnam and Mexico with 5.87 million pounds and 7.47 million pounds in the same period of time. China, Vietnam and Mexico together comprise around 95% of the total pecan exports in shell from the US.

In the shelled pecan segment, the main importers of US pecans are Canada, The Netherlands, the United Kingdom, Israel and Mexico, who have imported on aggregate 57.7 million pounds in average over 2009-2013 (USDA-GATS 2015).

Pecan imports into the US are coming almost exclusively from Mexico (over 99% of the total imports), with an average of 50 million pounds per year in the period between 2010 and 2014. The US remains a net exporter of pecans with the rest of the world, though the trade balance in pecans is negative with Mexico.

C. Current U.S. Supply of Pecans

The production of pecans in the US can be evaluated separately for *native varieties* or *seedlings* and *improved varieties*. Over the past 10 years, there has been a trend to increase the production of improved varieties, while the production of native varieties has remained stagnant (USDA-ERS 2014).

Production from improved varieties was 235 million pounds per year in 2009-2013. The native/seedling production of pecans in the same period was 51.5 million pounds, which represents less than 20% of the total production.

The cyclical pattern and the trends in the pecan production are shown in Figure 6. Agricultural practices have been implemented in recent years by some growers to reduce the variation in yields, which has attenuated the effect of "on" and "off" years in the production.

The commercial pecan production in the US takes place in 15 states, which can be grouped in three regions, described in Figure 7. These three regions are: **Western Region**, consisting of: New Mexico, Arizona, California; **Central Region**, consisting of: Texas, Oklahoma, Louisiana, Mississippi, Arkansas, Missouri, Kansas; and **Eastern Region**, consisting of: Georgia, Florida, Alabama, North Carolina and South Carolina.

The production of pecans is distributed across all three regions, with most of the harvest in the period between 2002 and 2014 coming from three states, one in each region: Georgia, New Mexico and Texas, with 32%, 22% and 18% of the total production of pecans respectively. All three regions have production of improved varieties. The native production however, is heavily concentrated in the region of origin of the pecan tree: the Central Region. In native/seedling production, Oklahoma, Texas and Louisiana have the lead with 70% of the entire country's native/seedling production. In terms of number of acres in production, around 40% of the total acreage of pecans are native varieties (USDA-NASS 2015), but this varies by region of production. According to the 2012 Agricultural Census data (USDA-NASS 2015) in the Central region, acreage for native varieties is 60% of the total acres under production; in the East only 16% is seedlings and almost no native acreage exists in the West.

The variety being grown is highly relevant to any analysis, since production practices, farm sizes, costs and prices are very different for improved and native varieties. Most of the horticulture advances have taken place in commercial orchards producing mostly improved varieties. According to the American Pecan Board (2015), commercial farms in production using improved varieties range between 20-50 trees per acre. The native production on the other hand may have as little as only one tree per acre in some cases.

Farm sizes also differ by region. Across all regions more than 70% of the reported farms have 50 or more acres under production. In the Central and West regions, almost half of the farms have between 50 and 499 acres under production, but less than 30% of the farms are this size in the East. The very large farms of 500 acres or more represent 23%, 28% and 44% of the acreage in the Central, Western and Eastern regions respectively, showing a higher concentration in large producers in the Eastern region.

D. Growth in U.S. Supply of Pecans

As was previously mentioned and described in Figure 6, there has been a positive trend in pecan production in the past decade. However, the production of pecans is still only 1-2% of the total tree-nut production in the US, while other nuts have had a stronger growth (USDA-ERS 2014) as seen in Figure 8. Wood, Payne, and Grauke (1994) pointed out that the lack of appropriate marketing in pecans may be one of the reasons for the industry not to continue the development rate it had in the 20th century.

The new plantings are almost entirely improved varieties. The cyclical nature of production and prices has generated a response in supply, especially in high price years (*off* years). Changing land use in pecan farms under production to a different use is highly impractical, thus exit from the market is not very common. On the other hand a particular reaction that can have consequences is the planting in low yield / high price years ("off" years).

Improved variety trees planted begin production 6-7 years later. As a reaction to the prices for pecans behaving as shown in Figure 9, considerable planting activity took place in 2010 and 2011 (American Pecan Board 2015) which will come into production in 2016-2018. This added production could put some pressure in price and be a challenge for the pecan industry in the coming years if no marketing development and promotion takes place.

E. Current U.S. Demand for Pecans

The US also leads the world consumption with an average of 288.5 million pounds per year in the period between 2008 and 2012, yielding the highest per capita consumption with 0.45 pounds per individual per year on average (USDA-ERS 2014). As shown in Figure 10, the consumption has remained relatively stable throughout the years until recently, when it has a decreasing trend.

This decrease in domestic consumption does not match the increase in production described in Figure 6. The increased production has been recently fueled by on the export market that has been growing at a faster rate than the domestic market.

Another component of the explanation of the gap between production and utilization figures is the held inventories by the handlers. Given the cyclical nature of the pecan tree production handlers of pecan, which include buyers and shellers, hold on to stocks of production in some years, a process usually referred to as accumulation. Figures 12 and 13 describe the behavior of beginning and ending stocks and their interaction with the domestic use and international trade.

F. Trends in U.S. Demand for Pecans versus other tree nuts

Pecans, like any other fruit and vegetable in the US are not exempt from the trends amongst US consumers. The most pertinent of these trends is the decline in consumption of fruits and vegetables in the diet, in spite of the revisions to the US dietary guidelines (Palma and Knutson 2012). A clear illustration is given by Figure 14 that describes the per capita consumption decline of fruits and tree nuts in the US over the last decade.

Another challenge is the competition of pecans in the fruit sector with less expensive imports (Palma, Ribera, and Bessler 2013). Furthermore, the biggest challenge in this regard is competition with other nuts, where some of these industries have invested more in marketing efforts than the pecan sector for stimulating the demand.

As seen in Figure 15, tree nuts prices have an increasing trend. A simple time series regression analysis of prices reveals that the slopes of the price regressions for each nut, which indicate the speed at which the prices are increasing, is higher for all the nuts depicted in the graph (almonds, walnuts and pistachios) compared to pecans. When reducing the span in years of the regression analysis to more recent years, the differences in the rate of increase of the prices are stronger in the last five years from 2009 to 2014.

Not all is gloom and doom in the pecan market trends. Palma, Ribera, and Bessler (2013) show that as income level increases so does the consumption of fruits and vegetables, including nuts. This information can be used to target market segments that would react to promotion activities. Onozaka and Mcfadden (2011) show that production claims, e.g. fair trade, local, organic, etc, have an effect in the price consumers are willing to pay for fruits and vegetables. Furthermore, Palma, Ness, and Anderson (2015) suggest that some consumers react to key attributes of food products that provide them status. These consumers have a tendency to pay higher prices for food with attributes they find satisfying a need for status, e.g. local, organic or healthy.

For pecans in particular, Palma, Collart, and Chammoun (2014) found in a discrete choice experiment that if no additional information other than variety is provided about the products, individuals were willing to pay a premium of $0.13 on average at the retail level for the native varieties of pecans compared to no information. The price premium can be linked to the connection of the "native" attribute with the perception of natives being a "natural" product. This could be used to plan targeted marketing strategies in native/seedling pecans increasing the potential benefits of the FMO. However, it is not considered in the price differentials shown later in the report as this is a route the proponent group may or may not take.

G. U.S. Tree nuts Crop Value

The increasing trends in the production of tree nuts and in the prices, especially in almonds, have increased the value of the tree nut production in the US. Figure 16 shows how the nut production value has increased since 2000. In this figure it can also be seen that the growth in crop value in nuts has come mostly from almonds, pistachios and walnuts. In the graph a line showing the share of pecans in the value of nut production is plotted on the right axis. It is clear to see that in this period the market share of the pecan sector to the nut industry has experienced a precipitous decline, from over 20% of the total nut market in the year 2000 to around 5% of the entire crop value of tree nuts in 2014. If anything at all, this relationship shift can serve as an illustration of how other tree nut crops have exploited their growth potential and the pecan industry has lagged behind other nuts.

Interestingly, the three nuts driving the increase in crop value are almonds, walnuts and pistachios, which have regulated marketing orders in place. The first two have marketing programs in as part of their federal marketing orders, and the latter has benefited from increased quality standards. Both of these aspects are properties of the proposed FMO for pecans. Of course, this correlation structure does not imply causation: two events being related, does not mean that one causes the other. However, the data seems to point in that direction, but it should be recognized that there are other factors at play in the market.

Nevertheless, several studies have shown there is a positive effect of promotion on demand of agricultural products in general (Williams, Capps, and Palma 2008, Lee et al. 1996, Neff and Plato 1995, French and Nuckton 1991) and specifically in tree nuts (Moore et al. 2009, Crespi and Sexton 2001, Florkowski and Park 2001). The methods across the studies in the literature differ, but the unequivocal effect has been that having a marketing program (funded by a Federal Marketing Order in the case of the literature cited above) increases demand for the products. A list of these studies can be found as Appendix A of the report.

With that in mind and for more than illustrative purposes the plots in Figure 17 draw attention. In the graph one of the series drawn is the share of the total crop value of tree nuts in the US for **pecans.** The other series in Figure 17 is the share of that same total for **walnut** production. A vertical line indicates the year when the marketing program for Walnuts under the Marketing Order that regulates walnuts grown in California was implemented. It can be seen that though the walnuts value share from all tree nut market was coming from a decreasing trend, the positive momentum is enhanced by the implementation of the marketing program.

The story in Figure 18 is quite similar. Again, one of the plotted series is the **pecan** share of the total value of tree nuts and the other one is the market value share of **pistachios**. A federal marketing order for pistachios was implemented in 2005 which called for quality assurance and testing. The trend in the share of the value is positive from that point onward.

Section II: Costs and Benefits of the Proposed Federal Marketing Order

This section of the report looks at the costs and benefits of the FMO and other relevant economic considerations.

A. Generic Promotion Increases Demand and Prices. We have reviewed the literature of a number of agricultural studies to determine the effects of generic promotion campaigns on agricultural product demand and prices. Generic promotion over a wide variety of agricultural products stimulates product demand that translates into higher prices for growers than would have been the case without promotion, as shown in the table from Williams and Welch (2014) as Appendix A in the report. Examples include almonds, cotton, dairy, dried plums, eggs, Hass avocados, blueberries, honey, beef, pork, lamb, mushrooms, orange juice, potatoes, raisins, rice, sorghum, soybeans, strawberries, table grapes, walnuts, watermelon, wheat.

B. Effectiveness of Tree Nut Promotions: Costs and Benefits to Growers. The estimates of the effectiveness of marketing programs used for this report are based on analysis of post implementation data of marketing orders in tree nuts (almonds and walnuts) and on ex-post implementation data from the Texas pecan promotion program. These studies find that demand for product increases after the establishment of generic promotion programs. The increased demand results in increases in prices that could not be achieved without promotion. Demand increases in those studies have been as high as 6%. Our analysis allows the midpoint of these studies (between 0% and 3% in the tree nut studies) to be the representative scenario and we have used the average of potential demand or approximately 1.5% in our evaluation for benefits of the FMO promotion authority. These marketing programs reviewed are well-established programs, so our report assumes that the proposed FMO for pecans would be less effective at least at first.

The cost of the assessment as a percentage is calculated by taking the midpoint assessment value for improved and native/seedling varieties and dividing it by the average prices for an in shell pound of pecans for each year described in the tables.

With season average prices of $1.73, $1.90 and $2.12 per inshell lb in 2012, 2013, and 2014 respectively assessments as a percentage of U.S. season average prices are in the range of 1.2-1.4% for improved varieties. Similarly, with average inshell per pound prices of $0.88, $0.92, and $0.88 in 2012, 2013, and 2014 the assessment as percentage of grower price was between 1.6 and 1.7%.

Although handlers pay the assessments in federal marketing orders, such as this FMO, for analytical purposes and to take the most conservative case, we are assuming that 100% of the assessments will be reflected in prices paid to growers, i.e. the growers will bear the cost initially. As you note from table ES3, the assessments/costs are a small percentage of the grower's price even if the grower bears all assessment costs.

Using historical data and information provided by farmers in the different production regions and NASS/USDA, and using price per pound data for 1997 - 2014 a mathematical simulation model was created. We used Monte-Carlo simulation methods for the distributions of key output variables crucial for analyzing feasibility of future business decisions under risk. The simulation model is programmed in SIMETAR©, a simulation and risk analysis software embedded as an add-in in Excel (Richardson, Schumann, and Feldman 2006). The framework of creating a representative farm to analyze risk is widely used in policy analysis, including potential impacts of the Farm Bill (Richardson, Schumann, and Feldman 2006). This avoids using averages, which can be misleading, and instead use data from the entire distribution of historical data. We then apply the 1.5% average generic promotion demand increase to the calculations related to pecans and obtain the following results:

The procedure we used involves taking the historical yearly prices from 1997 to 2014, and using the full distribution over those prices to obtain Monte-Carlo simulation for 500 possible prices to obtain the expected average price without the FMO intervention. We then adjusted the historical prices with a demand increase of 1.5% to simulate the possible prices with marketing promotion efforts due to the FMO to get an expected price increase of $0.063 with the FMO for improved pecans as shown in Table ES4. In a similar fashion, for native/seedling the valuation is done using the historical price for a Monte-Carlo simulation before the intervention (without the FMO) and after the marketing program (with FMO). The result is a $0.036 increase in price for native varieties.

The low and high bound were calculated using a simulation with low (0.5%) and high (3.0%) price increase scenarios. The potential benefits due to promotions through the FMO are between 4 and 9.6 cents with an average of 6.3 cents per pound for improved varieties; and between 2.7 to 4.2 with an average of 3.6 cents per pound for native/seedling varieties. Comparing Table ES1 and Table ES3 to Table ES4, it is apparent that the benefits of generic promotion outweigh the costs to growers.

C. Effectiveness on Stimulating Demand Through Increased Quality Standards. One of the authorities of the Council in the FMO (986.69) is the authority to make improvements in product handling. Specifically increasing the quality of pecans (freshness, safety, grade, size, packaging, etc.) delivered into the market can stimulate demand and increase prices. If the Council is able to establish minimum quality standards for handling in the future for pecans, this can lead to a relatively more inelastic demand and more consumer confidence in the product, which will lead to higher prices to growers. The cost of implementing product handling improvements has always been low compared to the benefits to growers. This would be illustrated by the case of pistachios where Alston et al. (2005) show that improving quality assurance in the pistachios resulted in a benefit to cost ratio of at least 5:1.

D. Costs and Benefits Across Various Farm Sizes. With the cost and benefits per pound described in Table ES3 and Table ES4, we have estimated the costs and benefits of the FMO promotion authority by farm size as shown in Table ES5. Table ES5 is shown for 30 acres, 175 acres and 500 acres at 1666.67 lbs of inshell pecans per acre (average yield per acre over all three regions), as representative for small, medium and large farms in the production area. Production assumes 78% improved variety and 22% native/seedling split in acreage.

In all cases the benefits of the FMO outweigh the costs across a range of farm sizes. The cost of FMO is calculated at the average as total pounds times the cost. For example, in the medium farm size of the total 291,667 lbs, 227,500 lbs are in improved variety (291,667 * 0.78) at an average cost of $0.025 we obtain a cost of $5,688 in improved varieties. The production of native/seedling is 64,167 lbs (291,667 * 0.22) at an average cost of $0.015 we obtain $963. The total costs then is the sum of the cost for improved varieties of $5,688 and native/seedling of $963 for a total of $6,650. The benefit is calculated using the total number of pounds times the estimated average increase in price. For improved varieties, 227,500 lbs times the average price increase of $0.063 we obtain $14,333 and for native/seedling we have 64,167 lbs for benefits of $2,310. Total benefits are the sum of benefits of improved varieties and native/seedling ($14,333 + $2,310) for a total of $16,643. The benefit Cost Ratio (BCR) is simply the additional benefits generated by the program per dollar of cost. Dividing the estimated benefits by the cost we obtain 2.5 which means a $1 cost results in $2.5 dollars of benefits.

The range of benefits for a medium size farms using the low scenario is $10,833 to a high scenario of $24,535. The associated range of the costs for the medium size farm is $5,192 and $8,108 respectively. For a small farm, the costs are in the range of $890 (low scenario) to $1,390 (high scenario) with benefits of $1,857 to $4,206 for the low and high scenario respectively. For a large farm, the costs are in the range of $14,833 to $23,167 for the low and high scenario and the benefits of $30,950 to $70,100 for the low and high scenario. In all cases the benefits outweigh the cost. The BCR ranges from 2.08 in the low scenario to 3.02 in the high scenario, which are on the low side of the studies reviewed by Williams and Welch (2014).

In reality, the model for estimating the stochastic prices is more complicated but this is a simple representation of the costs and benefits by farm size.

E. Minimum Size of Farm/Crop for Commercial Growers as used in the FMO. The full input costs for an acre of pecans across the production area requires a certain minimum land size or minimum annual production to be maintained in order for the farm to be economically viable over a period of four years. Failure to have a farm of a certain size or with yields above a certain size would result in either an economically unprofitable farm operation or would require a grower to reduce the necessary inputs on the farm to grow quality pecans over a period of time (reduced watering, moving, spraying, fertilizing, hedging, pruning or other inputs normally required by commercial pecan producers).

We believe, it is highly unlikely, even remote, that a pecan grower can be financially viable over a period of four years (Representative Period, as used in the FMO) if the grower is averaging less than 50,000 lbs of pecans per year over that period, and is applying all inputs associated with a commercial pecan grower. Said another way, pecan farmers growing less than 50,000 lbs of pecans on average per year are hobby farmers, experimental farmers, farmers not intending to make a profit or farmers not intending to maintain their farm with the normal inputs of a commercial pecan farmer. We used a yield of 1,666.67 inshell pounds an acre over 30 acres, which is the average yield across the production area calculated by the

Proponent Group with input from Dr. Lenny Wells, University of Georgia Pecan Research Scientist.

F. Handler Considerations; Costs and Benefits. The benefits to the handlers outweigh the costs of implementing the FMO. It is evident at the handler level, there is the same magnitude of positive price change as there is with the grower analysis (Table ES4), but a smaller proportion of cost due to the greater prices paid to handlers (Table ES8 as compared to Table ES3). With a typical handler margin of $0.575 the cost estimate of average handler price received was $2.31 in 2012, $2.48 in 2013 and $2.70 in 2014 for improved varieties. The cost estimate of average handler price received for native varieties was $1.46, $1.50 and $1.46 in 2012, 2013, and 2014 respectively. The cost as percentage of U.S. pecan handler prices is low and in the range of 0.93% to 1.08% over the last three years for native varieties and 1% to 1.03% for native varieties.

G. Parity. The anticipated increases in pecan prices from promotion and handling authorities in the FMO should cause pecan prices to move towards parity pricing (as stated by the USDA to be $5.11 per inshell lb for 2014) but the implemented FMO should not cause pecan prices to be anywhere near equal to or exceeding pecan parity prices.

H. Better Information Will Benefit Growers, Handlers and Consumers. The pecan market today is inefficient, in part because of the lack of reliable, timely data on the domestic pecan crop. Most data on the pecan industry at this time is gathered voluntarily. The FMO proposes handler reports to the Council and requires the Council to make crop reports to the USDA at least yearly. These reports should provide all parties with more reliable product data. Increased confidence in the data on pecans should benefit all participants (growers, handlers and consumers) and lead to more accurate product pricing, and better information regarding product supply and demand.

Thank you!