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**AGRICULTURAL DEVELOPMENT SUPPORT II
HAITI**



**University of Arkansas,
Fayetteville**

THE RAISING OF PIGS BEFORE AND AFTER
PEPADEP (LES CAYES REPORT)

Report #32

ADS-II
Agricultural Development Support Project II

THE RAISING OF PIGS BEFORE AND AFTER PEPADep

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THE RAISING OF PIGS BEFORE AND AFTER PEPADep

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THE RAISING OF PIGS BEFORE AND AFTER PEPADep

I. Objectives

Before the eradication of pigs in Haiti in 1982-83, so as to eliminate African swine fever, the raising of pigs was an integral part of the rural economy. It is often stated that pigs were the peasant's bank, being sold to cover such expenses as marriages, school fees and emergencies. Their eradication, therefore, would have represented a serious situation in the peasant household reducing not only an important source of revenue generation and protein but also a means of security to cover unforeseen expenditures.

Despite the importance of pig raising in the peasant economy before the eradication program (PEPADep - Projet pour l'Eradication de la Peste Africaine et Developpement Elevage Porcine), the authors know of no study that documents the importance and extent of pig raising at that time and contrasts it to pig raising at present. This information is, however, essential if one is to have a base of comparison to judge the relative successes or failures of the pig reintroduction program.

This study was initiated to better understand various characteristics of pig raising in the past and to use this knowledge to assist in the reintroduction of pigs and the improvement of pig raising methods in the ADS II (Agricultural Development Support Project II) farming systems program. It is hoped the results of the study will be of use not only to ADS II but also to other organisations interested in developing pig raising in Haiti.

Although this report presents the results from only the Les Cayes area, a similar study has been implemented in the Jacmel farming systems project. The results of the Jacmel study will be presented at a later date.

II. Methodology

The ADS II farming systems project at Les Cayes has four major sites of intervention. The sample for the study was randomly chosen from these four sites which have a combined population of 603 households (see Table 1).

Table 1. The Household Sample and Population of the ADS II Pig Raising Study

Location	Topography	# Sample H/holds	Total # H/holds
Charlette-Laforce	Plain	20	222
Jogue-Durocher	Plain	20	132
Macieu-Boudet	Plain	20	156
Fond-des-Frères	Mountain	21	93
		--	---
		81	603

Twenty households were randomly sampled from each site. In addition, the replacement household at Fond-des-Frères was also interviewed to give a sample number of 81.

The interviews took place in the last week of January and the first week of February 1987. The questionnaire used was written in Créole and in addition to precoded responses contained space for recording replies not previewed (see Appendix 1). The questionnaire was essentially divided into two parts: the first, concerning the importance of, and details on pig raising before PEPADÉF and the second, which included questions on the attempts made to replace pigs after their eradication and details on pig raising at present. Before the formal interviews, the questionnaire was first tested with three households, following which, revisions were made to improve the clarity of certain questions and precoded responses.

The interviews were conducted by ADS II employees (moniteurs) who are also farmers in the project's sites of intervention. This, coupled with a lot of goodwill between the project and its cooperating farmers, was felt to be sufficient to overcome much of the hesitancy of households to discuss a painful topic in their lives. Nevertheless, two of the 81 respondents furnished patently false information, for example, one household claimed that before PEPADÉF it had an inventory of 427 pigs with a total value of \$49000. Significantly, both the households who gave false information were not engaged in a farming activity and hence have limited contact with the project. The inventory and value data from these households were excluded from the analysed results.

III. Results and Discussion

The results are presented in separate headings which correspond to the different sections of the questionnaire, wherever possible a comparison is made between pig raising before PEPADep and at present. A summary of the results is presented at the end of the individual sections.

Incidence of Pig Raising Before PEPADep and at Present

It is widely accepted that some 90% of rural households raised pigs before PEPADep. The results of the survey confirm this assertion and are presented in Table 2.

Table 2. Incidence of Pig Raising Before PEPADep and at Present

	Number	% of total households
Before PEPADep	76	93.8
Present	6	7.4

Of the 81 sampled households, 76 raised pigs before PEPADep or some 94% of the sample population, while at present there are just six households currently raising pigs, or 7% of the sample. This compares favorably to the ADS II National Agricultural Survey data for the Southern Department, where 3% of farming households were raising pigs in the second season 1986. A higher proportion raising pigs would be expected in the PEPADep study since it is sampled from areas where the ADS II Project has been encouraging the reintroduction of pigs.

Using the binomial distribution, one can calculate a 95% confidence interval for the given population on the incidence of pig raising before PEPADep and at present (see Appendix 2.) For before PEPADep, we can state with a 95% degree of confidence that the incidence of pig raising in the given population was between 88.9% and 98.7% of the total number of households. For the incidence of pig raising at present, and with the same degree of confidence, we can state that between 2.1% and 12.7% of the households currently raise pigs.

The given confidence intervals are applicable only to the population of 603 households from which the sample was drawn. However, given the high proportion of households raising pigs before PEPADep and the fact the sample comes from four differing locales (each with very similar proportions of pig raising) in the Cayes region, one is tempted to use the results as an approximation for the whole Cayes area. On this basis then, it is probably not unreasonable, as a rough approximation, to say that some 90% of rural households in the plain of Cayes and adjacent mountains raised pigs before PEPADep.

Inventory and Value of Pigs before PEPADep and at Present

For the survey, respondents were asked to recall the number of pigs they owned before PEPADep according to sex and maturity, and to give an estimated total value for each category. A similar question on the inventory and value for pigs the household is currently raising was also asked. A summary of the average inventories and values for pigs past and present is presented in Table 11.

In evaluating the reliability of the data before PEPADep, the authors believe that because of the previous importance of pig raising, respondents can indeed remember back four years on how many pigs were raised and their estimated value before the eradication program. This assertion was confirmed in the pre-test of the questionnaire when respondents showed no hesitancy in quoting the number of animals raised before PEPADep by both sex and maturity as well as their estimated value.

The usefulness of this information is two-fold: firstly, it quantifies the importance of pig raising before PEPADep, and secondly, it provides a means to evaluate the pig reintroduction programme in terms of the number of households with pigs and the average number of animals per household.

Consulting Table 11, we see that for the sample as whole before PEPADep the total inventory of pigs was some 750 animals with an estimated value of some \$26000. Dividing these totals by the number of households who raised pigs, one obtains an average total value of pigs per household before PEPADep of \$351. Given that some 80% of Haitians have an average per capita income of less than \$250 (World Bank), this clearly indicates the importance of pigs in the past. For those households with pigs at present the average total value of their animals is \$253, some \$100 less than in the past. This difference is explained by a much lower number of animals kept today than before the eradication program. For example before PEPADep, on average, households kept almost 10 pigs, including piglets, which compares to the current average of two pigs per household. It should be noted, however, that certain persons involved in the eradication program believe the number of animals kept in the past was less than suggested by this study. One source believes the average number of adult pigs per household raised before PEPADep was just two animals (IICA).

Using these averages and the proportion of households keeping pigs before PEPADep and at present, along with the 95% confidence levels presented in Appendix 2, one obtains an estimate of the total pig population past and present. Since with a 95% degree of confidence we can say that between 88.9% and 98.7% of the total population kept pigs before PEPADep, we can also state that for the given population this represents a total number of households of between 536 and 595. At an average of 5.4 adult animals per household, this provides an estimate for the

total number of adult pigs in the given population of between 2900 and 3210. A 95% confidence interval calculated in the same manner for the number of adult pigs being raised at present is between 19 and 115 animals. That is to say, there is only a 5% probability that the total number of pigs in the 603 household population is less than 19 or greater than 115.

Comparing the average number of pigs per household and the difference in the total pig population past and present, one appreciates the gap between current and former pig numbers. A policy implication is the necessity to maintain the current support for the pig repopulation program.

Evaluating the differing values according to the age and sex of pigs, one sees that today's prices for males, sows and piglets are respectively twice, three times and almost ten times more expensive than they were in the past. The higher prices today are mainly a function of the limited supplies of pigs compared to the past. Hence, as pig numbers continue to rise one would expect pig values to fall. Although it is tempting to use past prices to indicate to what levels pig values will fall, given the alleged higher productivity of the introduced animals and changes in relative prices since the eradication program this is not possible. Rather, past pig values provide the lower range of what prices may be expected to be following the successful reintroduction of pigs into Haiti.

Characteristics of Households Raising Pigs Past and Present

It was hypothesized that in rural households, where the head of the household was engaged in a farming activity, there would be a higher incidence of pig raising than if he/she was engaged in a non-farming activity. The incidence of pig raising according to these two categories is presented in Table 3. The hypothesis that the incidence of pig raising in the past may have differed according to the location of households was also tested. The proportion of households raising pigs before PEPADDEF according to whether the household was located in the plains or in the mountains is presented in Table 4.

The results do not indicate there is a significant difference between the proportion of households raising pigs before PEPADDEF according to the head of households occupation (see Appendix 3). Although there are insufficient observations for a significance test for those raising pigs at present, a simple comparison between the proportions in Table 3 does not provide evidence to indicate farming households are more likely to raise pigs at present than non-farming rural households.

Table 3. Incidence of Pig Raising Past and Present According to Occupation of Head of Household

	Number	% h/holds with pigs	% h/holds by activity
BEFORE PEPADDF			
- Farmer	63	82.9	79
- Non-Farmer	13	17.1	21
	--	----	----
	76	100	100
PRESENT			
- Farmer	5	83.3	79
- Non-Farmer	1	16.7	21
	--	----	----
	6	100	100

Table 4. Incidence of Pig Raising in the Past According to Location of Households

Location	Number	% H/holds with Pigs	% H/holds by Location
Mountain	20	26.3	25.9
Plain	56	73.6	74.1
	--	----	----
	76	100	100

Examination of Table 4. fails to provide any evidence that there was a difference in the proportions of households raising pigs before PEPADDF according to whether they were located in the plains or in the mountains.

Importance and Reasons for Keeping Pigs Before PEPADep

In the survey, those respondents who raised pigs before PEPADep were asked to indicate the importance of pigs in terms of revenue and food. Four possible responses were possible and, in addition, space was made available to record relevant information volunteered by the respondent (see Table 5).

Table 5. Importance of Pig Raising Before PEPADep in terms of Revenue and Food

Importance	REVENUE		FOOD	
	Number	% Raising Pigs	Number	% Raising Pigs
Very Important	52	68.4	38	50.0
Important	22	28.9	34	44.7
Not V./Important	2	2.6	1	1.3
Not Important	0	0.0	3	3.9
	--	----	--	----
	76	100	76	100

Consulting Table 5, one clearly sees the importance of pig raising to the household in terms of both revenue and food. Over 97% and almost 95% of respondents respectively claimed that pigs were important or very important in terms of their revenue and food. The qualitative assessment of the importance of pigs in terms of revenue is reinforced by the quantitative data supplied by households on the value of their pigs (see Table 11).

It is often stated that pigs in Haiti fulfilled the role of a bank to rural households before the pig eradication program. To test this hypothesis and to better understand for what other reasons pigs were raised, households were asked to give their response to each of three non-mutually exclusive reasons for having kept pigs before PEPADep. In addition, space was made available in the questionnaire to enter responses that did not match the pre-recorded reasons for keeping pigs.

The three reasons for keeping pigs that were provided to the respondents included the pigs value in terms of food and revenue and the ability to use pigs as a bank to pay for major expenditures such as marriages and school fees and/or emergencies. A summary of the reasons given for raising pigs is presented in Table 6.

Table 6. Reasons for Raising Pigs before PEPADDP

Reason	Number	% Raising Pigs
Food	71	93.4
Bank	75	98.7
Revenue	70	92.1
@Other	13	17.1
-Buy Land	10	13.1
-Buy Head(s) Beef	3	3.9
-Buy Horse	1	1.3

@ - information volunteered from respondents

All households, except one, which raised pigs before PEPADDP claimed they used the animals as a bank to pay for important expenditures such as school fees and marriage costs. In addition, over 90% of households stated that pigs were kept as a means of food and revenue. Some 13 households volunteered additional reasons for keeping pigs including buying land, beef cattle and horses that represented respectively 13.1, 3.9 and 1.3 % of the total households raising pigs.

Method of Raising Pigs Past and Present

It is believed that the general environment for raising pigs is currently better than what it was before the eradication program. This is explained by a much higher value for pigs at present than in the past, this in turn has provided the incentive to households to minimize animal losses through improved raising systems. Also, many of the organisations in the repopulation programme have insisted on the construction of an improved rearing systems as a precondition for households or associations to receive the animals.

To verify these differences, the questionnaire offered respondents the following non-mutually exclusive descriptions of their raising systems.

* porcherie - an "improved" system that was defined as having a cement floor, enclosed pen and some sort of overhead shelter.

* parc - defined as an enclosed area for pigs without overhead shelter.

* à la corde - a system whereby the pig is secured by a rope but no man made shelter is provided.

* savanne - where the pig is left to roam more or less freely without provision of any shelter or raising pen.

Other - any raising system that did not fit into the above categories.

The respondent, where applicable, was asked to state which raising system(s) best described the environment used to rear pigs before PEPADep and at present. The results are presented in Table 7.

Table 7. Pig Raising Systems Employed Before PEPADep and at Present

Rearing System	Number	% Raising Pigs
BEFORE PEPADep		
- porcherie	1	1.3
- parc	29	38.2
- à la corde	75	98.7
- savanne	44	57.9
- other	1	1.3
PRESENT		
- porcherie	6	100
- parc	0	0
- à la corde	0	0
- savanne	0	0
- other	0	0

As expected, the use of "improved" systems was not widespread before PEPADep with just one household out of 76 claiming to have used such a system. This is in direct contrast to the method of raising pigs at present, where all households use a "porcherie" for raising their pigs. The most common method for raising pigs in the past was "à la corde" practised by itself or in combination with a "parc" or "savanne" system.

Another difference between pig rearing today and in the past is felt to be the type of feed fed to the animals. It often stated that households are in general more reliant on bought feeds such as concentrates or wheat bran than was true in the past. To verify this hypothesis and to find the range of foods fed in the past and present, a list of 21 different foods was presented to respondents and they were asked to indicate which items did they feed to their animals before PEPADep and which foods are fed to their pigs at present. The results are presented in Table 8.

The results indicate that a greater variety of food was fed to pigs before PEPADep than at present. For instance, there were 15 food items fed to pigs that were used by over 50% of the households before PEPADep. This compares to just 8 items that are used by over 50% of households for feeding pigs at present.

Evaluating the use of wheat bran and feed concentrates, one sees there is a much greater reliance on purchased foods today than before PEPADep. Presently, 100% and 83.3% of households are feeding their pigs wheat bran and feed concentrates respectively. This figure compares favorably with the ADS II National Survey data from the Southern Department for the second agricultural season 1985, which found that some 80% households were using prepared feeds and/or purchased foods for their pigs. This contrasts with the situation before PEPADep, when just 10.5 % of households used wheat bran and 2.6% of households fed concentrates to their pigs.

Table 8. Food Types Fed to Pigs Before PEPADep and Present

Type	BEFORE PEPADep		PRESENT	
	Number	% With Pigs	Number	% With Pigs
kitchen scraps	76	100.0	4	66.7
sweet potato vines	75	98.7	4	66.7
banana skins/stems	51	67.1	1	16.7
katié seeds	1	1.3	0	0.0
palm seeds	50	65.8	1	16.7
sorghum bran	76	100.0	5	83.3
avocados	76	100.0	5	83.3
feed concentrate	2	2.6	5	83.3
wheat bran	8	10.5	6	100.0
rice bran	30	39.5	5	83.3
vitamins	3	3.9	2	33.3
salt	40	52.6	2	33.3
corn	60	78.9	4	66.7
bean shells	61	80.3	4	66.7
oranges	44	57.9	0	0.0
doulé	42	55.3	1	16.7
breadfruit	69	90.8	4	66.7
jackfruit	67	88.2	3	50.0
sapotille	16	21.1	0	0.0
manioc	42	55.3	1	16.7
mango	75	98.7	3	50.0

Health Status of Pigs Before PEPADep and at Present

It is often stated that the introduced pig is less able to cope with hardships of the Haitian environment than was the Créole pig. To confirm this hypothesis it would be necessary to compare the health and performance of a substantial number of créole and introduced pigs over a range of environments. A second best alternative is to compare the health status of animals before PEPADep with the present day. The flaws in this approach are several, not the least being the respondents' ability after

four years to remember the frequency of sickness in his/her animals. Another reason for comparing the health status between the past and present is to indicate the possible ailments that could affect the introduced pig as more animals are raised under traditional methods as practiced before FEPADep.

In the survey, respondents were asked to give the incidence of five ailments that commonly affect pigs. This was asked of households that kept pigs in the past as well as those raising pigs at present. The results are presented in Table 12. Great care should be taken in making direct comparisons between the two periods since all pigs at present are being raised under an "improved" environment, whilst this was true of only 1.3% of households before FEPADep. Hence, even if the introduced pig was less able to cope in the Haitian environment than its creole cousin, it may still have a lower incidence of disease because of its healthier surroundings.

As expected, the frequency of fever in pigs was much more widespread before FEPADep than today, an indication of the success of the eradication program. In the past, 86.8% of households stated that fever was found in their animals with 36.8% claiming its frequency was either "sometimes" or "often". The other ailments found in the past in order of frequency include non-specific external parasites, diarrhea, scabies and hernias. The only reported health problem for pigs at present was diarrhea, being reported by two of the six households currently raising pigs.

Use and Success of Replacements to Pig Raising

It was hypothesized that given the importance of pig raising in the rural economy most households would have attempted to replace pigs with some other economic activity. However, given the special role that pigs seemed to fulfill for the household it appears unlikely that the success of the replacement(s) would be comparable to that of pig raising.

In the questionnaire, respondents were asked if they had tried to replace pig raising with some other type of animal raising. Surprisingly, only 18 out of 76 households or some 24% of respondents raising pigs before FEPADep, had tried to replace pigs with some other form of animal raising. This question was meant to include increases in the existing stock of animals and any new raising systems adopted to replace pigs. If the question was asked and replied to correctly, one could conclude that pigs filled a niche in the rural economy not easily replaced by some other activity.

The households who did attempt to replace pigs with another form of animal raising were asked to specify the type of animals used as replacements. In addition to a precoded list of six species presented to the respondents, space was made available to

record an additional two animal species. Although the question strictly referred to animal raising, two respondents volunteered that they attempted to replace pigs by buying land. These and other responses are presented in Table 9.

Table 9. Replacements to Pig Raising Tried by Households

Type	Number	% of H/holds With Pigs	% Replacing Pigs
goat	10	13.2	55.6
sheep	6	7.9	33.3
chicken	9	11.8	50.0
rabbit	0	0.0	0.0
beef cattle	10	13.2	55.6
introduced pig	0	0.0	0.0
horse	4	5.3	22.2
donkey/mule	3	3.9	16.7
turkey	2	2.6	11.1
land	2	2.6	11.1

Several households tried replacing pigs with a number of different animals. The replacements most commonly used were goats, beef cattle and chickens, each of which were tried by 50 % or more of the households attempting to replace pigs.

For those households who tried replacing pigs, the respondents were asked to compare the success they had with their replacements as a whole with their former pig raising. Three coded responses were possible: more success, the same success or less success. The results are presented in Table 10.

Table 10. Success of Replacements Compared to Pig Raising

Success	Number	% of H/holds Replacing Pigs
more success	5	27.8
same success	2	11.1
less success	11	61.1
	--	----
	18	100.0

Only seven (39%) of households attempting to replace pigs achieved the same or greater success with their replacements as a whole than with their previous pig raising. Conversely, 11 households (61%) achieved less success with their replacements than with their former pigs. This supports the assertion that it was difficult for households to fill the gap left after pigs by the adoption of another type of economic activity.

Method Used by Households to Obtain Introduced Pigs

It is hypothesised that given the relatively high cost of pigs at present, many households on an individual basis are unable to purchase the animals. It is suggested, therefore, that many of the households currently raising pigs have obtained their animals in association with other households or through a donation. Of those households purchasing pigs themselves, it is asserted that some other asset of the household would have needed to have been sold so as to be able to afford the purchase of the animal(s). If this is indeed true, it may indicate that the inventories of other domestic animals, such as goats, may fall as pigs become more widely adopted.

Unfortunately, since the survey found only six households currently raising pigs, little of significance can be inferred from the results. Further, the sample was selected from sites where the ADS II project has been encouraging pig production by distributing pigs to farmer associations. Hence, one would expect a greater incidence of pigs obtained through donations than in other areas.

The results show that of the six households currently with pigs: three purchased the animal(s) themselves, two received their pigs in a form of donation, and one household obtained the animal(s) in association with other households. Two of the three households purchasing the animals themselves did so through income from their work and one household paid for the pig(s) by selling a head of beef. Given the small number of respondents presently with pigs, these results cannot be used to confirm or deny the stated hypotheses on how households are currently obtaining their pigs.

IV. Summary of Results

The survey was undertaken on a sample of 81 households from a population of 603 households in four separate sites. Some 94% of the sample households kept pigs before PEPADep compared to just 7% of households who keep pigs at present. The average number of pigs per household in the past for those raising pigs was almost 10 animals. This contrasts to an average of just two pigs per household for those raising pigs at present.

In evaluating households according to occupation characteristics, there is no reason to believe that the incidence of pig raising was higher for farm households than non-farm households either in the present or the past. No significant difference was found in the incidence of pig raising by households in the past according to whether they lived in the mountains or plains of Cayes.

The importance of pigs for households before PEPADep is shown in the average inventory value of some \$350, some \$100 more than the average inventory value per household today. Respondents raising pigs before PEPADep were also asked to give the importance of the animals in terms of income and food. Over 90% of households claimed pigs were either very important or important in terms of both revenue and food.

The principal reasons given by over 90% of respondents for keeping pigs before PEPADep include: as means of providing food and income to the household as well as acting as a bank to cover contingencies and major expenditures.

The method of raising pigs in the past is significantly different to what takes place today. Over 98% of households kept their pigs on a "à la corde" system before PEPADep, this compares to 100% of households raising pigs today who raise their animals in a "porcherie". Further, the reliance on purchased feeds for rearing pigs is much more today than it was before PEPADep. For those households which keep pigs at present, 100% of them feed wheat bran to their animals and 83% feed concentrates. This compares to just 11% of households feeding wheat bran and 3% feeding concentrates before PEPADep. In the past also, households fed a greater variety of different types of food to their pigs than is true today.

Regards health status before PEPADep, the most frequent problem experienced by pigs was fever. In descending order of importance the next most frequent ailments were non-specific external parasites, diarrhea, scabies and hernias. For pigs at the present time, the only recorded ailment was diarrhea, found in the animals of two of the six households currently raising pigs. However, comparison on the health status between the two periods is not possible for a several reasons, not the least being the high incidence of African swine fever before the eradication program.

Only 24% of households raising pigs before PEFADDP attempted to replace pigs with another raising system. The most common replacements being goats, beef cattle and chickens. Of those trying to replace pigs after the eradication program, only 39% of the households experienced a greater or equal success with their replacements when compared to their past pig raising.

Of those households currently with pigs, three purchased the animals themselves, two received the pigs through a donation and one household obtained the pig(s) through an association with other individuals.

Table 11. Inventory and value of Pigs Before PEPADEP and at Present

	# of Households	% Households With Pigs	Average # Per Household	Average value Per Pig(\$)	Total Numbers	Total value(\$)
Before PEPADEP						
- males	55	36	3.4	56	221	12,441
- females	65	86	2.9	52	189	9,615
- piglets	45	59	1.6	13	342	4,416
- all pigs	76	100	9.9	N/A	752	26,672
At Present						
- males	3	50	1.3	110	4	440
- females	4	67	1.0	160	4	640
- piglets	2	33	2.0	110	4	440
- all pigs	6	100	2.0	N/A	12	1,520

Table 12. Frequency of Allments in Pigs Before PEPADEP and at Present

	OFTEN		SOMETIMES		RARELY		NEVER	
	Number	% With Pigs	Number	% With Pigs	Number	% With Pigs	Number	% With Pigs
BEFORE PEPADEP								
Fever	13	17.1	15	19.7	36	50	10	13.2
Diarrhea	1	1.3	2	2.6	10	13.2	63	82.9
Scabies	0	0	2	2.6	9	11.8	65	85.5
Hemnia	0	0	2	2.6	0	0	74	97.4
External Parasites	1	1.3	5	6.6	7	9.2	63	82.9
AT PRESENT								
Fever	0	0	0	0	0	0	6	100
Diarrhea	1	16.7	1	16.7	0	0	4	66.7
Scabies	0	0	0	0	0	0	6	100
Hemnia	0	0	0	0	0	0	6	100
External Parasites	0	0	0	0	0	0	6	100

APPENDIX 2.

Using the binomial distribution, one may construct a confidence interval for the incidence of two mutually exclusive events for a population provided the sample was randomly chosen and if the following holds true (see Salvatore, p 74):

N = Total Population

n = Sample number

p = proportion of "successes" in population

\bar{p} = proportion of "successes" in sample

$n > 30$

$np > 5$

$n(1-p) > 5$ and where p may be used as an estimate for \bar{p}

Hence, calculating the 95% confidence interval for the incidence of raising pigs before FEPADef for the given population in the study of 603 households.

$$\bar{p} \pm z_{.05} \sqrt{\frac{p(1-p)}{n}} \sqrt{\frac{N-n}{N-1}}$$

$$0.938 \pm 1.96 \sqrt{\frac{(0.938)(0.0617)}{81}} \sqrt{\frac{603-81}{602}}$$

$$0.938 \pm 1.96 (0.0267) (0.9312)$$

$$0.938 \pm 0.0487$$

Therefore, a 95% confidence interval for the incidence of pig raising by households before FEPADef for the given population (603 households) is between 88.9% and 98.7%.

Calculating the 95% confidence for the incidence of pig raising at the present time.

$$\bar{p} \pm z_{.05} \sqrt{\frac{p(1-p)}{n}} \sqrt{\frac{N-n}{N-1}}$$

$$0.07407 \pm 1.96 \sqrt{\frac{(0.07407)(0.9259)}{81}} \sqrt{\frac{603-81}{602}}$$

$$0.07407 \pm 1.96 (0.0291) (0.9312)$$

$$0.07407 \pm 0.0531$$

Therefore, a 95% confidence interval for the incidence of pig raising by households at the present time for the given population (603 households) is between 2.1% and 12.7%.

APPENDIX 3.

$H_0 : P_f > P_{sf}$

$H_a : P_f \leq P_{sf}$

Where

P_f = Proportion of the total number households raising pigs before PEPADep where the head of the household is engaged in farming activity = 82.9% (63 households).

P_{sf} = Proportion of the total number of households interviewed where the head of the household is engaged in a farming activity = 79% (64 households).

If P_f is significantly greater than P_{sf} then one fails to reject the null hypothesis that households engaged in a farming activity had a higher incidence of raising pigs before PEPADep than did non-farming households. Constructing a 95% confidence interval for the proportion of households engaged in a farming activity and raising pigs before PEPADep (see Salvatore, p 74.):

$$\bar{p} \pm z_{.05} \sqrt{\frac{p(1-p)}{n}} \sqrt{\frac{N-n}{N-1}}$$

$$0.829 \pm 1.96 (0.04183) (0.936)$$

$$0.829 \pm 0.0767$$

Therefore, a 95% confidence interval for the incidence of raising pigs for farming households before PEPADep is between 75.2% and 90.6%.

Since P_{sf} falls within the 95% confidence interval calculated above, one is unable to say there is a significant difference between the proportion of households raising pigs before PEPADep and engaged in a farming activity and the proportion of households engaged in a farming activity in the sample as a whole. Hence, there is no evidence to support the null hypothesis that households engaged in a farming activity were any more likely to raise pigs before PEPADep than households not engaged in a farming activity.

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