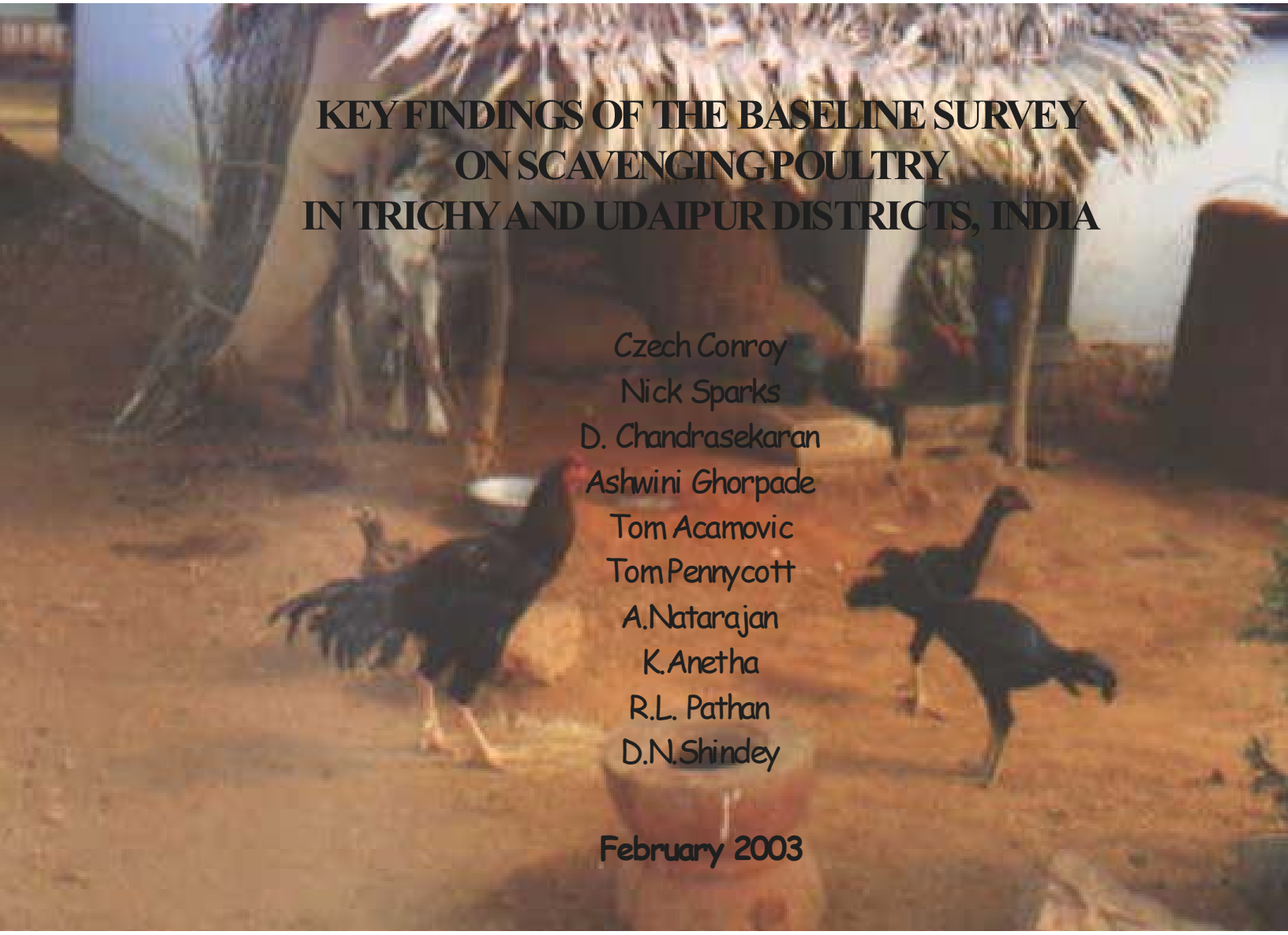

KEY FINDINGS OF THE BASELINE SURVEY ON SCAVENGING POULTRY IN TRICHY AND UDAIPUR DISTRICTS, INDIA

Czech Conroy
Nick Sparks
D. Chandrasekaran
Ashwini Ghorpade
Tom Acamovic
Tom Pennycott
A.Natarajan
K.Anetha
R.L. Pathan
D.N.Shindey

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Natural Resources Institute

SAC

LPP

BAIF

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DFID Department for International Development

1. Introduction

This survey report is part of a research project on scavenging poultry in India, funded by DFID's Livestock Production Programme[1]. The project is entitled *"The Use of Alternative, Tanniniferous, Saponin and Antioxidant Containing Materials in Improving the Health and Production of Scavenging Poultry"*. It is managed by the Scottish Agricultural College's Avian Sciences Research Centre, and is carried out in collaboration with the Natural Resources Institute (UK), and with two Indian organisations, BAIF Development Research Foundation (BAIF) and Tamil Nadu University of Veterinary and Animal Sciences (TANUVAS).

The project is working in two different parts of India, namely Tamil Nadu in the south and Rajasthan in the north-west - more specifically, in Trichy and Udaipur Districts respectively. These districts were chosen for two reasons. First, backyard poultry-keeping is an important livelihood activity for many households in both locations. Second, the locations are quite different in terms of their agro-ecology and ethnic groups, so this will enable the project to investigate how different production systems and constraints are between the two districts, and to assess how generic potential solutions might be.

Udaipur district is located in the Aravalli hills, and has a mean annual rainfall of about 650 mm. Rainfall is uni-modal, the monsoon season lasting from late June to late September. Trichy District is also uni-modal, with an annual rainfall of 700 mm.

The project methodology involves a combination of fieldwork, laboratory work and on-station trials. This report summarises and reviews some of the results of a baseline survey conducted in the two project districts in the first half of the year 2001, as the first activity in the programme of fieldwork. The second activity, a monitoring programme, is now being completed. Later this year a programme of feed-related trials with poultry-keepers in the survey villages is envisaged. The baseline survey was carried out so that the project could: (a) quickly obtain a general overview of the situation in the two project areas; and (b) generate baseline production information that would help in ascertaining the impact of any future project interventions in the selected villages.

2. Methodology

2.1 Survey tools

Thirty households were surveyed in each of the two project districts. Most of the individuals interviewed were women. An interview schedule (questionnaire) was used, that had been developed and pilot tested in early 2001. This is reproduced in this report as Appendix 1. Direct observation was also used to supplement information gathered through the questionnaire regarding housing etc.

[1] This document is an output from a project (R7633) funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

Collecting information about hatchability and mortality This information was obtained by getting the owner to recall what had happened to one or more specific clutches in her/his flock during the previous 6-9 months, and to record this information on a chart. (A written version of the chart can be found at the end of Appendix 1.) Since many poultry-keepers are illiterate, this was done by getting them to place the appropriate number of small stones (or whatever) in the relevant cell: small stones etc. were used to show numbers of eggs or birds. This PRA method was developed by the project team to facilitate recall, to eliminate misunderstanding between poultry-keepers and the researchers and to improve accuracy. As far as we know, this was the first time that this kind of diagram has been used for this purpose. The chart was large (filling a whole A3 sheet) and was based on symbols, rather than words (for example, to show spoilage, predation, disease or sale), so that it could be understood and filled in by the poultry-keepers.

2.2 Selection of villages and respondents

Trichy District, Tamil Nadu The general project area was chosen partly on the basis that the state veterinary services were working closely with poultry-keepers here, and were interested in cooperating with the project team in the research; and partly because it was reasonably accessible from Namakkal, where the TANUVAS researchers are based. The TANUVAS team itself did not have a previous record of working on an ongoing basis in villages in Trichy, so the cooperation of the veterinary services was seen to be important in helping the team to establish a good rapport with the villagers.

Three categories of backyard poultry-keepers were identified in this district by the team prior to the survey. It was decided to conduct a stratified survey that would cover 10 people from each category. It was also decided to select a village, if possible, that contained all three types of poultry-keeper, so as to minimise the influence of other variables. This would enable us to be relatively confident that any differences found between the three groups could be attributed to the nature of their poultry-keeping systems, rather than other extraneous factors (e.g. distance from poultry market). Peruganur village satisfied this criterion.

The three categories of poultry-keepers were:

- Category 1 = small and marginal farmers whose home and poultry are adjacent to their agricultural land
- Category 2 = small and marginal farmers whose home and poultry are separate from their agricultural land, i.e. in a nucleated settlement
- Category 3 = landless people who live in a colony (hamlet), with poultry kept in and around the house.

Udaipur District, Rajasthan The project team decided to work in three villages of Baghpura block, since BAIF has a strong operational presence in this block, where it is implementing a European Union-funded rural development project. It is envisaged that relevant findings of this research project will be taken up by the rural development project. The people living here are predominantly tribal, mainly belonging to the Bhil tribe. Ten poultry-keepers were selected in each village. The project planned to work through women's self-help groups (SHGs) in this project area, so the respondents selected were primarily members of these groups.

3. Flock Size and Structure

As can be seen from Table 3.1, flock size in Peruganur averages 18.3. There are marked differences, however, between the three categories of poultry-keeper, with C3 flock sizes being less than half those of C1 flock sizes on average.

Table 3.1 Mean Numbers of Birds per Flock in Peruganur

	Category 1	Category 2	Category 3	Overall
Layers	2.8	1.9	1.0	1.9
Pullets	0.5	0.5	0.3	0.4
Cocks	1.7	1.9	0.3	1.3
Chicks	11.4	10.1	6.0	9.1
Growers	9.7	3.2	3.7	5.5
TOTAL	26.1	17.6	11.3	18.3

Mean flock size in the Udaipur villages is fairly similar across the three villages (see Table 3.2). Overall, at 12.2, it is substantially less than in Peruganur, but quite similar to the C3 flock size there. In Udaipur there are more growers than chicks overall, whereas in Peruganur there are more chicks than growers. This may be related to seasonal variations in flock structure: these two districts are in different parts of India and have slightly different climates and seasonal variations in rainfall.

Table 3.2 Mean Numbers of Birds per Flock in Udaipur Villages

	Pargipada	Richawar	Jagannathpura	Overall
Layers	1.8	2.1	2.2	2.0
Pullets	1.3	2.6	0.7	1.5
Cocks	0.9	0.7	1.0	0.9
Chicks	4.0	0.0	3.2	2.4
Growers	2.3	7.4	6.5	5.4
TOTAL	10.3	12.8	13.6	12.2

4. Reasons for Keeping Poultry

Respondents were asked to rank their reasons for keeping poultry, according to their relative importance.

4.1 Peruganur, Trichy

In Peruganur, most C1 poultry-keepers said that their main reason for keeping poultry is to generate income (see Table 4.1). The other main reason given was for home consumption. These two factors accounted for all of the first ranked reasons, and seven of the second rankings. The other factor that featured as a second main reason was 'Ready source of income', i.e. as a savings bank to provide cash to meet contingencies. Another reason that was given quite often, ranked by some as third or fourth most important, was 'Sacrifice'.

Table 4.1 Reasons Given for Keeping Poultry by Peruganur Villagers (Top Four Rankings)

	C1				C2				C3			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Income*	7	3			3	6	1		4	1		
Home consumption	3	3	3		7	3			4	1	3	1
Gift				1					1			
Sacrifice			3	3			3	7		1	3	3
For guest			1	2				2		1	2	4
Easy to manage				2						1		
Ready source of income*		4	2			1	6		1	5	2	

* 'Income' refers to planned and regular income-generation, whereas 'Ready source of income' refers to sudden unplanned sale to generate income to cope with unforeseen contingencies, such as illness in the family.

Among C2 poultry-keepers income and home consumption were again almost the only reasons given in the top two rankings, but their frequency as most important reason is reversed, i.e. home consumption is given more often than income. Conversely, 'Income' is cited more often as the second most important reason. 'Ready source of income' also gets several mentions, nearly all as the third most important reason. 'Sacrifice' is mentioned by everyone in C2, mainly as a fourth most important reason for keeping poultry.

The rankings are slightly different again among C3 poultry-keepers. Income and home consumption are cited four times each as the most important reason, but each is only cited once as the second most important. For four of them home consumption is only the third or fourth most important reason for keeping poultry. 'Ready source of income' has now become the most frequently mentioned second most important reason, suggesting that for this particularly poor group poultry assume greater significance as a disposable asset to be used when contingencies arise. This group also cite 'for guest' more frequently (seven times) than the C1 and C2 groups (three times and twice respectively).

Data from the clutch histories show the actual importance of different uses of poultry for the three categories, as summarised in Table 4.2. They show that the proportion of birds sold were approximately the same for C1 and C2, and substantially less for C3. In *percentage terms* home consumption was much higher in C3 than in the other two groups, as were 'Sacrifice' and 'Gift'. In *absolute terms*, given C1's larger flock sizes, the level of home consumption is similar to that in the C3 group.

There is a reasonable degree of consistency between the information in the two tables. The main anomaly is that most C2 poultry-keepers said that home consumption was the most important reason for keeping poultry, but in percentage terms they consume less poultry than C1 poultry-keepers. One possible explanation for this discrepancy is that home consumption may be seasonal, and the clutches on which Table 4.2 is based may have been outside the main consumption season.

Table 4.2 Disposal of Market-Age Birds from Peruganur (percent)

	C1	C2	C3
Sold	70.73	71.8	47.6
Home consumption	7.87	4.55	18.3
Sacrifice		4.55	9.76
Gift		0.9	9.76
Retained as stock	21.40	18.20	14.63

4.2 Udaipur villages

In Udaipur, 'Income' is only mentioned once as a reason for keeping poultry, reflecting the non-commercial nature of backyard poultry production in this district (see Table 4.3). Home consumption is easily the most frequently given *principal* reason for keeping poultry. The other most frequently (27) cited reason was 'For guest', which was only cited 12 times in Peruganur. On the other hand, 'Sacrifice' is mentioned less often (16 times) here than it was in Peruganur (26).

Table 4.3 Reasons Given by Udaipur Villagers for Keeping Poultry

	1	2	3	Total
Income	0	1	0	1
Home consumption	21	2	5	28
Gift	1	2	0	3
Sacrifice	3	3	10	16
For guest	2	14	11	27
Easy to manage	0	0	0	0
Ready source of cash	2	8	4	14

5. Perceived Problems in Keeping Poultry

Respondents were asked to rank the problems of poultry-keeping in terms of their relative importance.

5.1 Peruganur

Overall, predators and disease are perceived as being of roughly equal importance in Peruganur, as can be seen from Table 5.1. Predators are seen as the main problem by 12 poultry-keepers, and the second most important by nine; while disease is seen as most important by 11 and second most important by 10. Among category 1 and 2 poultry-keepers the two problems account for the vast majority of the top three rankings – 18 of the 20 top rankings and 16 of the 20 second rankings.

Among category 3 poultry-keepers feed-related problems acquire greater importance. This may be explained by the fact that C3 poultry-keepers are landless, and therefore

they have to purchase grains; whereas C1 and C2 villagers have farms, and probably produce a substantial proportion of the grains given to their poultry.

Table 5.1 The Most Highly Ranked Problems (Numbers of Respondents per Rank per Problem)

Category	Predators			Disease			Feed[2]			Medicine[3]		
	Rank (numbers)			Rank (numbers)			Rank (numbers)			Rank (numbers)		
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
1	4	4	2	5	4		1				1	
2	5	4	1	4	4		1	2	1			4
3	3	1	1	2	2	4	3	3	6		2	2
TOTAL	12	9	4	11	10	4	5	5	7	0	3	6

5.2 Udaipur villages

In the Udaipur villages, as in Peruganur, predation and disease are perceived as being the most important problems. Roughly equal numbers of poultry-keepers rank them as the first and second most important problems: no other problems are ranked as first or second most important. Health service availability was ranked the third most important problem by 17 respondents, and feed availability by seven of them.

Table 5.2 Rankings Given to Different Problems in the Udaipur Villages

Problems	Ranking				
	First	**Second**	**Third**	**Fourth**	**Fifth**
Predators	14	16	0	0	0
Diseases	16	14	0	0	0
Feed availability	0	0	7	4	1
Feed cost	0	0	0	0	0
Health service availability	0	0	17	2	0
Health service cost	0	0	0	2	2
Others	0	0	0	0	0

6. Hatchability and Mortality

The data described in this section were collected through the clutch history method described in section 2. It is possible that respondents made recall errors or deliberately gave inaccurate answers (although we think the latter is unlikely), so they should not be regarded as totally reliable. Data from the current monitoring programme will provide a cross-check on these data.

[2] The list of possible problems that was included in the questionnaire included both feed availability and feed cost. The rankings for these two problems were relatively few, compared with disease and predators, so they have been combined in this table.

[3] The point explained in the previous footnote also applies to 'Medicine'.

6.1 Peruganur village, Trichy District

Summary data for Peruganor are given in Table 6.1

Table 6.1 Summary of Clutch History Data in Peruganur

	CATEGORY 1		CATEGORY 2		CATEGORY 3		OVERALL	
	Total	***Mean / clutch***	**Total**	***Mean / clutch***	**Total**	***Mean / clutch***	**Total**	**Percent**
Eggs laid	188	*12.53*	185	*13.21*	166	*12.77*	539	
Eaten/broken	6		10/2		7/2		23/4	
Kept for hatching	182	*12.13*	173	*12.36*	157	*12.08*	512	
Spoilage								
Spoiled/Embryo Mortality	22/1	*1.53*	32/1	*2.36*	39/1	*3.08*	93/3	18.2
Mortality								
Birds hatched	159	*10.60*	140	*10.00*	117	*9.00*	416	
Disease deaths	19	*1.27*	8	*0.57*	2	*0.15*		
Predation deaths	20	*1.33*	16	*1.14*	25	*1.92*		
Other deaths	3		1		2			
Total deaths	42		25		29		96	23.1
Birds reaching market stage	117	*7.8*	115	*8.21*	88	*6.77*	320	

Hatchability Overall, 18 % of eggs were spoiled (see Table 6.2). There are clear differences in the rate of spoilage between the three categories of poultry-keepers: it is highest in C3 and lowest in C1, the former being twice the latter. The reasons for this merit further investigation: some potential determinants will now be discussed.

Eggs spoil for a number of reasons. However, the primary causes are:

- the egg being laid in a damp and dirty environment,
- eggs being 'cleaned' post-lay by wiping with damp cloths or
- washing the eggs[4].

Another aspect that should also be considered however is the quality of the shell. Eggshell quality tends to be consistent in commercial flocks, with quality being highest at the beginning of the birds' reproductive life and lowest at the end. There have been few if any studies of shell quality in scavenging birds, which, given that the shell is the main barrier to contamination is perhaps suprising.

The data indicate that the percentage of spoiled eggs increases as the status of the keeper decreases. Three potential causes for this trend could be hypothesised. Firstly,

[4] By keeping the surface of the egg free of water bacterial contamination of eggs with spoilage organisms should be minimal.

the environment into which eggs are laid by hens kept by C3 keepers is more contaminated than that for C1. Secondly, compared with C3 keepers, C1 poultry keepers are better able to handle and store their eggs prior to incubation. Thirdly, the nutritional status of the birds kept by C3 keepers is poorer than those kept by C1 keepers and, as a consequence, the shell quality of eggs laid by 'C3' hens is poorer, allowing more bacterial contaminants to enter the egg. It is worth noting that spoilage of 10-15% may be expected for game birds in the UK (i.e. the nearest comparison in the UK to village poultry in terms of type and system).

Table 6.2 An Overview of Egg Spoilage and Mortality in Peruganur

	Category 1	Category 2	Category 3	Overall (%)
Spoiled eggs (%)	12.1	18.5	24.8	18.2
Mortality pre-grower (%), of which[5]	26.4	17.9	24.8	23.1
- Disease	11.9	5.7	1.7	7.0
- Predation	12.6	11.4	21.4	14.7
Total losses* +	37.5	36.4	49.6	41.3

* i.e. spoiled eggs plus mortality

+ the spoilage and mortality data are not strictly summable – they are not a percentage of 100. They have been aggregated here simply to give an overall picture of the severity of the losses, to facilitate comparisons between each group or village.

Causes of mortality The two main causes are predation and disease. Mortality from predation is higher than mortality from disease for all three categories of poultry-keeper (Table 6.2). Disease is highest in category one birds and lowest in category 3. This is a surprising finding for which there is no obvious explanation. One hypothesis, however, is that because category 3 poultry-keepers are away from their birds most of the day (doing wage labour) predators may consume diseased birds without the owner knowing the birds had been diseased in the first place.

The nature of *disease-induced mortality* will become clearer through analysis of data collected through the project's production monitoring programme. However, types of disease found in the are include: Newcastle disease, Fowlpox (esp. Wet pox), and Fowl Cholera.

All *predation mortality* was attributed to wild birds (see Table 6.3). The main type of predator for all three categories was large birds of prey (LBoP), while the second was small birds of prey (SBoP). Crows were the third type of predator, but were involved much less frequently. Predation mortality is similar (11 or 12%) for category 1 and 2 poultry-keepers, and highest (21.4%) for category 3. It would be interesting to discuss these differences with the poultry-keepers and to see if they can explain them, and also discuss with them the hypothesis mentioned above. (It should be noted that three C1 poultry-keepers had dogs that protected their birds.)

[5] There are other causes of mortality (mainly 'accidents'), but these are very minor compared with disease and predation. This can be seen by summing the percentages for these two causes and subtracting it from the total mortality figure, i.e. mortality due to other causes = 23.1-21.7 = 1.4%.

Table 6.3 Types of Predators by Category of Poultry-Keeper

Category of poultry-keeper	LBoP	SBoP	Crow	Fox	Cat	Mon-goose	Dog	Snake	**Total**
1	12	8	1						21
2	13	4	1						18
3	13	12	5						30
TOTAL	38	24	7	0	0	0	0	0	69

LBoP = large bird of prey
SBoP = small bird of prey

6.2. Udaipur Villages

A total of 15 clutch histories was taken from 10 respondents in each village. The results are summarised in Table 6.4. The mean number of eggs per clutch was highest in Jagannathpura, as was the number of deaths per clutch. One quarter of eggs retained for hatching were spoiled during hatching; and almost 42% of the birds that hatched died before reaching market age.

Table 6.4 Summary of Clutch History Data in Udaipur Villages

	PARGIPADA		**RICHAWAR**		**JAGANNATH-PURA**		**OVERALL**	
	Total	***Mean / clutch***	**Total**	***Mean / clutch***	**Total**	***Mean / clutch***	**Total**	**Percent**
Eggs laid	206	*13.7*	218	*14.5*	248	*16.5*	672	
Eaten								
Kept for hatching	194	*12.9*	198	*13.2*	231	*15.4*	623	
Spoilage								
Spoiled during hatching	51		58		61		170	25.3
Mortality								
Birds hatched	143	*9.5*	140	*9.3*	170	*11.3*	453	67.4
Disease deaths	30		25		20		75	
Predation deaths	27		34		38		99	
Accident & other deaths	2		4		10		16	
Total deaths	59	*3.9*	63	*4.2*	68	*4.5*	190	41.9
Birds reaching market stage								

Hatchability The average spoilage rate is 27.3%, and the rates are similar in all three villages (see Table 6.5).

Table 6.5 Egg Spoilage and Mortality Rates in the Udaipur Villages

	Source	Pargipada	Richawar	Jagannathpura	Overall %
Spoiled eggs (%)	Table 18.1	26.3	29.3	26.4	27.3
Mortality during first 6 months (%), of which[6]:	Table 18.3	41.2	45.0	40.0	41.9
- *Disease*	Table 18.3	*21.0*	*17.9*	*11.8*	*16.6*
- *Predation*	Table 18.3	*18.9*	*24.3*	*22.4*	*21.9*
- *Accident & other*	Table 18.3	*1.4*	*2.9*	*5.9*	*3.5*
Total losses*		67.5	74.3	66.4	69.2

* i.e. spoiled eggs plus mortality

+ the spoilage and mortality data are not strictly summable – they are not a percentage of 100. They have been aggregated here simply to give an overall picture of the severity of the losses, to facilitate comparisons between each group or village.

Causes of mortality Mortality rates are similar in the three villages, but Richawar's is slightly higher than the other two. Overall, predation (21.9%) is a more important cause of mortality than disease (16.6%), but in Pargipada disease is more important than predation. Jagannathpura has by far the lowest mortality rate from disease, and it would be interesting to know why this is.

Table 6.6 summarises the data on predation. It appears that by far the most important predator is the crow, which kills more chicks than all the other predators combined. The mongoose was also a significant predator, particularly in Richawar, and cats were the third most important.

Table 6.6 Types of Predator by Village in Udaipur

Village	LBoP	SBoP	Crow	Fox	Cat	Mon-goose	Dog	Snake	**Total**
Pargipada	0	0	20	3	2	2	0	0	27
Richawar	0	0	17	0	5	12	0	0	34
Jagannathpura	4	0	26	0	4	4	0	0	38
TOTAL	4	0	63	3	11	18	0	0	99

LBoP = large bird of prey
SBoP = small bird of prey

[6] Discrepancies between total mortality rates and the sum of the components are due to rounding up of decimal figures.

7. General Discussion

7.1 Flock Size

In Peruganur, C3 poultry-keepers have the smallest flocks, on average. The mean size is less than half that of the C1 poultry-keepers. **It would be useful to know why this is, as it would probably provide us with further insight into the constraints facing the poorest poultry-keepers.** It could reflect either a space constraint (for housing) or a feed constraint, or both, for C3 poultry-keepers. It could also be related to the higher losses (i.e. spoiled eggs plus mortality) they experience (see Table 6.2), and lower bird retention rates (see Table 4.2), compared with people in groups C1 and C2.

Mean flock sizes are also relatively small in the Udaipur villages. We know that they experience the highest losses (Table 6.5), and this may be the explanation for the small flocks. They all have farms, and feed availability was not seen as a major problem by them, although it was an issue for some (Table 5.2). In a previous survey, another reason given for limiting flock size was "the fear of mortality and the loss of the entire flock in the event of disease outbreak" (Kumtakar and Kumtakar, 1999).

Mean clutch sizes are slightly higher in the Udaipur villages (Table 6.4) than they are in the three Peruganor groups (Table 6.1).

7.2 Reasons for keeping poultry

The survey findings on this topic have highlighted differences between the three categories of poultry-keepers in Peruganur. They have also revealed major differences between the production systems in Peruganur vis-a-vis that in the Udaipur villages. The former is relatively commercialised, with an emphasis on sales and income-generation, whereas the latter is primarily geared towards producing birds for home consumption and, to a lesser extent, for guests.

This difference between the two districts is related to the availability of markets. Trichy district is famous as an area for producing local birds. There are major weekly markets there, with buyers coming from other parts of Tamil Nadu and also from Karnataka. In Udaipur, on the other hand, there is an absence of such markets. It may be that there is a higher level of vegetarianism in south Rajasthan: that is certainly the case in the adjacent state of Gujarat, which is officially vegetarian.

Udaipur itself is a tourist town, so there is a fairly high consumption of chicken by tourists, and the project villages are only about 1.5-2 hours' drive from Udaipur. However, it may be that foreign tourists are less able to discriminate between scavenging chickens and factory chickens than locals are, since in their home countries they would normally eat factory chickens. In Tamil Nadu, local people strongly prefer village birds to factory-produced ones, due to their recognised superior flavour, and this is reflected in higher prices for village birds.

7.3 Perceived problems

Predation and disease are perceived as the main problems in both project locations, and are assigned roughly equal importance. These perceptions are supported by the

mortality data. Problems related to feed and health services/medicine were mentioned by some poultry-keepers in both locations, but were not seen as being as important. More than half the respondents in Udaipur cited 'Health service availability' as the third most important problem. There are no state veterinary services that reach poultry-keepers in the Udaipur villages, whereas the level of services is much higher in the Trichy project area.

7.4 Hatchability

The mean spoilage rate is lower in Peruganur (18.2%) than in the Udaipur villages (25.3%). If it is statistically significant, it would be interesting to know why this is – it could be related to owners' practices, or it might be related to climatic differences. However, there is more variation within the project locations than there is between them, suggesting that differences must be mainly due to practices.

According to the clutch history data, spoilage of eggs is 25% in C3 group, and less in the other two groups (Table 6.2), being only 12.1% in C1. In Udaipur, spoilage rates are high in all villages, the differences between them being minimal. **If the project can identify why some groups have much lower spoilage rates than others, then there may be considerable scope for improving the situation of those poultry-keepers who are currently experiencing the greatest losses.**

In Peruganur, there are clear differences in the facilities and management practices in the C1 and C2 groups, as compared with C3.

First, agricultural land is available for scavenging in C1and C2, whereas the birds in C3 do not have access to agricultural land. (They are restrained from grazing their birds on other people's land by the landholders i.e. the C1 and C2 people.) Scavenging in agricultural land provides extra nutrition through spilled over grains, greens and quite large numbers of insects, which also furnish the required extra protein and amino acids. This is not available to C3 birds.

Second, the extra feed provided by C1 and C2 poultry-keepers is more in quantity and also in variety (different cereals). The birds in C3 are also given extra feed, but the type of cereal is mainly poor quality rice, which is available through the Public Distribution System. *Third*, a separate housing system is used by almost all households of C1 and C2 groups, whereas in C3 group a separate housing system is followed by only 50 % of the households.

7.5 Mortality in general

Mortality rates are much higher in Udaipur (41.9%) than in Trichy (23.1%), and the two major causes are predation and disease. Interestingly, a previous survey in the region of which Udaipur is part reported chick mortality as averaging 40% (Rangnekar and Rangnekar, 1999).

The situation regarding both predation and disease is worse in Udaipur than in Trichy[7], with the difference for disease-related mortality slightly greater than that for predation-related mortality. In principle, therefore, there is scope for massive improvement in the Udaipur villages, but this can only be realised if the project can gain an in-depth understanding of the nature of both predation and disease. The monitoring programme should make a valuable contribution to our understanding, as should post-mortems; but additional steps may be required to improve understanding of predation.

7.6 Predation-related mortality

In both Trichy and Udaipur, predation is a more important cause of mortality than disease. All predation is by birds in Trichy, the most important type of predator being large birds of prey, followed by small birds of prey, with crows playing a minor role. In Udaipur the main predator is the crow, and other birds of prey are unimportant. One possible explanation for this difference might be that there are differences between the two districts regarding the type and/or numbers of bird predators found there. **This needs further investigation.**

Predation is highest in category 3. One possible explanation for this is that most of these poultry-keepers (both men and women) are landless labourers, who spend the day away from their homes. Thus, there may be less adults around to frighten predators away or to protect the chicks. In addition, as was noted earlier, their absence may result in diseased birds being consumed by predators before the owners are even aware that the bird is diseased.

On the other hand, one might expect birds in category one to be more exposed to predators, since they are surrounded by fields, and hence potentially more vulnerable to foxes and mongooses. Category 2 poultry-keepers are similar to those in category 3 in that they live together in small colonies of houses, but perhaps different in that the women may be more likely to stay at home during the day.

We do not yet fully understand why some groups or villages experience higher predation rates than others. **This issue needs further investigation: when we understand it better, we can see whether there is any scope for reducing predation rates where they are currently highest.** For example, it would be desirable to know how much predation occurs during the day, and how much at night[8]; and where the birds are, and how old they are, when they are caught.

7.7 Disease-related mortality

There is a bigger difference between the districts in disease-induced mortality than in mortality due to predation. This may be due to the fact that state veterinary services for poultry-keepers are much better in Trichy than in Udaipur. It may also be related to the fact that backyard poultry in Trichy is more commercialised than in Udaipur, which may give people more incentive to invest in health care.

[7] Strictly speaking, the mortality data from the two districts are not comparable, as the Trichy data only cover the period up to grower age, whereas the Udaipur data cover the period up to six months of age. However, the Trichy survey showed that there is very little mortality once birds have become growers.
[8] Night shelters have been recommended as a means of reducing predation (Kumtakar and Kumtakar, 1999), but clearly they would be ineffective if predation was only during the day.

In Peruganur, disease-induced mortality is lowest in category 3. We do not know why this is, but some possible reasons will now be presented. Earlier, it was suggested that this might be explained by predators consuming diseased birds before the owner has noticed that they are diseased.. Another possible explanation is that the separate housing used by people in C1 and C2 groups creates housing conditions conducive to the incubation and spread of disease.

Birds in categories 2 and 3 are kept in nucleated settlements, so one would expect that if there were an outbreak of an infectious disease it would be transmitted more easily in these categories. Birds in category 1 may have less contact with domestic poultry from outside their own flock. Thus, the fact that they have the highest level of disease-related mortality is a little surprising.

On the other hand, flock size is higher in C1 than C2 and C3 categories. In highly congested populations, if one bird is affected with one disease (not necessarily Newcastle Disease) others will also easily pick up the infection because of their movements and frequent contacts between birds. Apart from this, birds of C1 are having poor weight gain compared to others, which may be due to the heavy parasitic infection. This condition may predispose the birds to bacterial and viral diseases.

As mentioned earlier, the clutch information was collected based on the recalling capacity of owners for the recent one or two clutches. Hence, recall errors are possible. The data obtained through the survey should be cross-checked with those from the production monitoring programme.

In the Udaipur villages disease-induced mortality was lowest in Jagannathpura (11.8%) and highest in Pargipada (21.0%). This could be a transient difference due to random events. **The monitoring programme data should be checked to see whether this kind of difference between the villages is ongoing or not. If it is, then clearly it should be investigated further.**

7.8 General

The survey has provided a good overview of many aspects of poultry-keeping. It has shown that predation is a more important cause of mortality than disease in both Udaipur and Peruganur, although both are important in most villages and groups. Previous studies have not recognised predation to be as important as disease. One survey that was undertaken in the same general region as Udaipur district described predation as the second most important cause of mortality (Rangnekar and Rangnekar, 1999). Another, in central Madhya Pradesh, noted that chick mortality was high, but did not specifically mention predators as a reason for this (Kumtakar and Kumtakar, 1999).

There are a few possible explanations for this difference between our findings and that of Rangnekar and Rangnekar. First, it may be that the three project villages in Udaipur are not typical of the general situation in the district or the region. Second, it may be that poultry-keepers normally tend to think of disease (more specifically Ranikhet) as more important than predation, because of the sudden and devastating effect that it can have (and hence gave this more emphasis in the previous survey in this area). Third,

Ranikhet is said to strike every 2 or 3 years, and it may be that the project villages had not experienced an outbreak for some time, and that this had influenced their judgement. If our survey had been undertaken shortly after an outbreak, more poultry-keepers might have ranked disease as the most important problem.

We can be reasonably confident, however, that we have an accurate assessment of the importance of predation in these villages, as the clutch mortality data confirm the poultry-keepers' opinions, as expressed through the problem rankings. In Peruganur, predation is relatively more important than disease, due to the fact that disease-related mortality is lower than in the Udaipur villages. As the two previous surveys were in areas where veterinary care is probably less than in Tamil Nadu, it is not surprising that our Tamil Nadu findings are different from theirs with regard to the importance of predation.

One factor that is not mentioned in the survey findings is theft of birds, although this was mentioned in the pilot survey. It may be that some losses attributed to predators were in fact birds that were stolen when the owner was not around. A previous survey refers to 'two-legged predators' (Rangnekar and Rangnekar, 1999).

References

Kumtakar, V.A. and Kumtakar, P. (1999) Rural family poultry scenario in tribal areas of central Madhya Pradesh, India: a socio-economic analysis. Free Communication No. 9. First INFPD/FAO electronic conference on family poultry production.

Rangnekar, S. and Rangnekar, D.V. (1999) Family Poultry Production in Tribal Belt of Western India. Free Communication No. 5. First INFPD/FAO electronic conference on family poultry production.

APPENDIX 1: BACKYARD POULTRY PROJECT – INITIAL BASELINE SURVEY

Date:
Village: Block:
District:

Introduction: *Introduce yourself and about your mission very patiently and in a simple understandable local language. Befriend them quickly. Act according to the situation. Raise up to their expectations.*

BASIC INFORMATION ABOUT POULTRY-KEEPER(S)

Name of the poultry-keeper(s):

Community (Circle - OC, BC, MBC, SC, ST): ……..

Landholding: Landless ….< 1 acre …. 1-2a. …. 2-5 a. …. >5 a. ….

Sex of interviewee(s): Male …. Female ….

Ask interviewee to identify major livelihood activities (tick below):
(Do not focus exclusively on income-generating activities)

Own agriculture ……
Agricultural labourer …..
Household work ….
Other (specify) …..

How many years has (s)he been keeping poultry? ……

2. CURRENT FLOCK SIZE AND STRUCTURE

Type/breed of birds (specify with their names and characters)

	Name	Character
1.		
2.		
3.		
4.		

Number of birds. Record numbers for each category, then add and check total with owner.

(a) Laying hens …….
(b) Pullets ……
(c) Cocks …….
(d) Chicks ……...
(e) Growers ……..
TOTAL …….

3. HOUSING

3.1 Observe housing and record type below with tick.

(a) Bamboo basket[9] ……..
(b) Baked mud ……
(c) Bench type ……
(d) Brick and cement ……
(e) Mud and stone ……
(f) Other (specify) ……

3.2 Quality of poultry housing

Size of the house and number of birds.

(a) How much space is there for how many birds? ……x….. ft. for ……..
Are birds getting enough space for sitting in the house, particularly at night? (Please tick) Yes ….. No ……
(Please observe and answer yourself)

(b) Is enough ventilation in the poultry house available? Yes ….. No …..

(c) Is there protection from snakes, cats and other predators? Yes ….. No ……
(Distinguish between scientist's and respondent's answers)

[9] If the basket has a cycle tube or other material attached to the rim, please add a plus (+) sign next to the tick.

3.3 Location of poultry housing (Please

(a) Poultry house is separate ……

(b) Poultry birds inside owner's house ……

(c) Poultry birds in owner's courtyard ……

(d) Poultry with other livestock ……

(e) Others (specify) …….

3.4 Equipment

(a) Is feeder provided? Yes ….. No …..
If YES, type? Hanging …… On ground ……

(b) Is water container provided? Yes ….. No ……
If YES, Source of water Open Well …….. Borewell …….. Others ……

(c) Regular cleaning of feeder Yes……. No……
(d) Regular cleaning of water pot Yes…….. No……..

3.5 Protection against adverse weather conditions

(a) If weather is very hot what do they do for reducing heat?

(b) If weather is very cold what do they do for reducing cold?

(c) If there is heavy rain what do they do to protect birds from the rain/dampness?

4. HATCHING SYSTEM

4.1 Selection of Egg:

a) Whether size of the egg is considered for hatching ?
If yes, Big size …… Small size…..
Normal size….
b) Whether colour of egg considered for hatching
If yes, specify colour …….
c) Whether age of egg is considered ?
If yes, how many days? ……

d) Which is the best season for hatching?
Beginning of winter season (write months) ……
End of winter season (write months) ……
Any other (Specify) ……..
e) Any method of testing fertile good eggs?
If yes, specify

4.2. Care of hatching egg

(a) Material used in the hatching basket
Grass…… Sand…… others (Specify)…….
(b) Daily checking? Whether eggs are alright……Brake……Soiling..
(c) If weather is very hot or dry, what efforts are made for cooling them? Specify ……
(d) If weather is very cool, what efforts are made for warming them? Specify? ……..

Care of the sitting hens and eggs

(a) Feeding Type of cereal …….. Frequency Quantity
Concentrate, if any
Others (Specify)
(b) Water Source Open well…… Borewell…….
Others …….
(c) Medicines (in water) Garlic……Onion……Others (Specify)
……..
(d) Frequency of coming out (from brooding place)
Once a day……Once in two days……
Others (Specify)……..

(e) Protection from; Predators (Specify)……
Thunder (Specify)
Insects (Specify)

5. REASONS FOR KEEPING POULTRY

(Ask reasons – do NOT read out the list below. First record answers with a tick. Then show interviewee relevant cards symbolizing reasons, and ask them to rank the reasons they have given.)

Reason/use	Tick	Rank (1,2,3,4….)
Income		
Home consumption (egg and meat)		
Gift		
Sacrifice		
For guest		
Easy to manage		
Ready source of cash		
Other (specify)		

6. HOME CONSUMPTION

(a) Which is more important for home consumption (please tick)
eggs ….. or
meat …..

(b) Who takes food first in your family? ……..
(c) Who takes food last in your family? …….
(d) Who eats meat, how often?

	MALE			FEMALE		
	Weekly	Monthly	<12 times per year	**Weekly**	Monthly	<12 times per year
Elders						
Children						
Sick						
Guests						

(e) Who eats eggs, how often?

	MALE			FEMALE		
	Weekly	Monthly	<12 times per year	**Weekly**	Monthly	<12 times per year
Elders						
Children						
Sick						
Guests						

Seasonal consumption differences and reasons

(f) Are there any seasonal differences in egg consumption? Yes…… No ….

If YES, please specify ….

(g) Are there any seasonal differences in meat consumption? Yes…… No ….

If YES, please specify ….

7. PROBLEMS IN KEEPING DESI BIRDS

(Ask problems – do NOT read out the list below. First record answers with a tick. Then show interviewee cards symbolizing the problems they have mentioned, and ask them to rank the problems.)

Problems	Tick	Rank (1,2,3,4…..)
(a) Predators		
(b) Disease		
(c) Feed availability		
(d) Feed cost		
(e) Health services availability		
(f) Health services cost		
(g) Other (specify)		

8. HATCHABALITY, MORTALITY ETC., BY CLUTCH

This information will be collected by use of the diagram, based on symbols.
(See attached recording format)
Identify two birds who hatched eggs and its chicks are > or 6 months old.
Write type of bird first then start exercise.

9. Ask interviewee(s), is there anything that you would like to ask us?

ADDITIONAL INFORMATION AND OBSERVATIONS

Full name of interviewer …….

RECORDING FORM FOR CLUTCH[1] HISTORIES

	Eggs laid	Kept for hatching	Hatched eggs	Grower age	Marketable age and/or weight		Currently Retained	
					Male (1.5 kg)	Female (1 kg)	M	F
Spoiled eggs[2]								
Disappear –reason not known								
Large bird of prey								
Small bird of prey								
Crow								
Fox								
Cat								
Mongoose								
Dog								
Snake								
Gift								
Sale								
Sacrifice								
Home consumption								
Disease								
Accident								
Others								

1. Use different colour for different clutch

2. Differentiate spoilage, like infertile eggs or mortality of grown chick in unhatched eggs.