



Risk perceptions and risk management strategies of insured and non-insured dairy farmers: A comparative study*

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ABSTRACT

This study was conducted to analyze the farmers' perceptions of risk and risk management among the farmers who had insured and non-insured their dairy animals. The data originated from a questionnaire survey of insured (120) and non-insured (120) dairy farmers in Gorakhpur district of Uttar Pradesh. Farmers' Socio-economic characteristics, risk perceptions and risk management strategies were documented. The average land holding, educational status and dairy farm experience of insured respondents was slightly larger than that of the non-insured dairy farmers. Epidemic livestock diseases, climate risk, marketing/sales risk, feed cost variability, Poor conception and delay in treatment/AI emerged as relevant sources of risk to the dairy farmers. The most relevant risk management strategy for the dairy farmers were vaccination of animals, having own agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. The intensity and domination of risk and risk management tool adopted by dairy farmers varied due to their personal perceptions of risk, socio-economic status of that farmer, farm type and institutional arrangements.

Key words: Dairy farmers, Insurance, Risk management, Risk perception

Severe losses in animal husbandry were reported by several studies: a morbidity and mortality rate of 31% and 9% in Himachal Pradesh in bovines (Chaudhary *et al.* 2013); incidence of 55.55% of peste des petits ruminants (PPR) in sheep and goats in Jammu and Kashmir (Mahajan *et al.* 2013); total annual economic losses due to foot and mouth disease (FMD) in India estimatedly range from ₹ 12, 000 crore to 14, 000 crore (Singh *et al.* 2013); avian flu in Manipur caused a total loss of 24.56 crore to poultry farmers, input industry, egg traders and retail outlets (Kumar *et al.* 2008). Disease outbreaks not only reduce the demand for livestock food products (Pritchett *et al.* 2005) but also make livestock farmers face with production, marketing, institutional, personal and financial risks (Hardaker *et al.* 2004). Risk perception and risk management strategies are now receiving increasing attention in decision-making and policy-making framework (Ahsan 2011). There is a common perception that Indian farmers are averse to change their production, financial and marketing practices as it is

commonly observed that they were reluctant to adopt new methods even when these provided higher returns than traditional technologies. Further the farmers have developed a number of risk management strategies. Resource poor farmers have less capacity to manage risks and that farmers as individuals differ in their goals and attitudes towards risks. Therefore, there is a need for field level studies to assess the validity of such perceptions in the country to be able to make effective interventions through development policies, programmes and farm advisory services. Studies were carried out in other countries on risk perception, risk attitude and risk management strategies of farmers in different sectors of agriculture (Ahsan and Roth 2010, Roslan *et al.* 2012, Bihan *et al.* 2013). However, literature available on these research themes in the Indian context is scant (Bardhan and Tewari 2007).

Keeping this in view, the present study was undertaken to provide empirical insight into dairy farmers' risk perception and risk management strategies. The aim of the paper is to: (i) examine farmers' perception about different sources of risks and (ii) evaluate farmers' perception of different sources of risk management strategies.

MATERIALS AND METHODS

Sampling: The study was carried out in Gorakhpur, Uttar Pradesh. Gorakhpur is one of the 12 districts selected for the National Livestock Insurance Scheme on the basis of higher milk production and had a higher number of cattle and buffaloes. Their owners were classified into group 1

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(farmers who had insured at least one cattle or buffalo from their herd) and group 2 (farmers who had never insured their dairy animals). Lists of dairy farmers who had insured their animals were obtained and 120 dairy farmers who had insured their milch animals were selected randomly from all over the district. Likewise, 120 cattle and buffalo owners who had never insured their dairy animals were selected, randomly. Thus, the ultimate sample comprised 240 cattle and buffalo owners. Furthermore, only those dairy farmers were selected for this study who owned at least 2 milch animals. Apart from primary data collected from the respondents, information from the secondary sources such as official records, discussion with different officials from bank, Department of animal Husbandry, insurance sector, etc. were also used for this study.

Data: Data for the study was collected with the help of a semi-structured schedule by personally interviewing the head of the sample households. The schedule consisted of questions related to: (i) socio-economic characteristics of the dairy farmer and farm, (ii) sources of risks perceived by the dairy farmers (including questions on sources of risk and risk attitude) and (iii) farmers' perceptions of various risk management strategies. All the respondents were interviewed in the local language i.e. Hindi. The schedule was pre-tested in two sessions with 5–10 dairy farmers in each session. After each session, the questions were modified according to the comments and suggestion of the farmers. The modified schedule was finally administered for collection of data.

Analytical framework: Descriptive analysis was carried out using frequency tables and percentages to assess the socio-economic profile of the respondents.

The risk perception of the respondents was assessed by identifying the different sources of risk and respondents were asked to give their opinion about each source of risk on a five point scale (irrelevant–1, somewhat irrelevant–2, neutral–3, somewhat relevant–4 and relevant–5). Likewise, farmers' perception of risk management strategies and their importance were analyzed on a five point scale (irrelevant–1, somewhat irrelevant–2, neutral–3, somewhat relevant–4 and relevant–5) (Bardhan and Tewari 2007).

RESULTS AND DISCUSSION

General characteristics of respondents: The main characteristics of the dairy farmers belonging to the 2 groups were compared (Table 1). The average age of the respondents who insured their dairy animals was lesser than that of the non-insured respondents. The average land holding, educational status and dairy farm experience of insured respondents was slightly larger than that of the non-insured dairy farmers. Farm size of insured respondents was larger than that of the non-insured dairy farms. Total average milk production and total income were larger in the insured dairy farms than that in non-insured dairy farms.

Sources of risk perception: The distribution of respondents according to their perception of different sources of risk is given in Table 2. The data elicit the average

scores of dairy farmers' perception – as measured on the 5–point scale – of each source of risk along with the standard deviations. Standard deviations of value more than one for each of the source of risk indicates that disparity exists among the dairy farmers' risk perception. The sources of risk perceived by large proportion of non-insured dairy animal owners to be either somewhat relevant or relevant were epidemic livestock diseases (89%), marketing/sale risk (85%), family health concerns (83%), climate risk (81%), feed cost variability (80%), poor conception (80%), delay in treatment/AI (74%) variability in milk price (70%), crop yield variability (70%), changes in production technology (70%), silent heat (65%), unavailability of veterinary doctor (64%) and anestrus (63%). The average scores for epidemic livestock diseases, marketing/sale risk and poor conception were high. High score attributed to epidemic livestock diseases may be due to frequent occurrence of epidemic livestock diseases every year in the study area.

Sources of risk perceived as somewhat relevant or relevant by large proportion of insured dairy animal farmers were epidemic livestock diseases (89%), feed cost variability (85%), delay in treatment/AI (83%), marketing/sale (80%), poor conception (80%), family health concerns (77%), climate risk (77%), crop yield variability (70%), changes of interests rate and ability to repay loans (70%), variability in milk price (69%), cost of operating inputs (67%), changes in production technology (67%), injury, illness/death of farm operator (67%), price variability of livestock products (65%), forage yield uncertainty (65%) and lack of labor force (in or out family) (65%). The average scores for none of the sources of risk were less than 3, which indicated that all the sources of risk were generally relevant for the insured dairy animal farmers. The average scores were less than 3.5 for risk sources like risk of consumer preferences, changes of agricultural policy, environment policy, burglary/theft etc, animal welfare policy, elimination of government support and changes in farm capital indicating that these sources of risk were somewhat less relevant compared to other sources or risk for insured dairy animal farmers.

Marketing system for milk was not developed in the study area as per the requirement of the dairy farmers. Dairy farmers sold their milk to nearby towns. The price of milk sometimes falls due to glut in production resulting in demand supply mismatch. Milk marketing was done mostly through middlemen who did not assure remunerative price to the dairy farmers for their milk. The dairy cooperative in the study area was not up to the mark in relation to the milk marketing. The AI facility was not adequate as the dairy farmers have to take their animals to the veterinary hospital for AI which is often located at far distance from their village thus, resulting in poor conception in dairy animals.

Meuwissen *et al.* (2001) observed that risks related to meat price, epidemic animal disease and milk price as the most relevant ones. Bardhan and Tiwari (2007) found that adverse effect on family health and lack of institutional support in dairy farming in India were perceived as major

Table 1. Socio-economic profile of the respondents in the study area

Sl.No.	Characteristics	Categories	Respondents (120 each)	
			Insured	Non-insured
1.	Age (years)	Young (<30)	12 (10.0)	17 (14.2)
		Middle (30–50)	91 (75.8)	78 (65.0)
		Old (>50)	17 (14.2)	25 (20.8)
		Average score	40.97	42.0
2.	Caste	General	52 (43.3)	51 (42.5)
		O.B.C.	65 (54.2)	63 (52.5)
		S.C.	03 (2.5)	06 (05.0)
		S.T.	00 (00.0)	00 (00.0)
3.	Education	Illiterate	26 (21.7)	23 (19.2)
		Read and write	15 (12.5)	19 (15.8)
		Primary	24 (20.0)	27 (22.5)
		Middle	25 (20.8)	27 (22.5)
		High school and above	30 (25.0)	24 (20.0)
4.	No. of dependents	Low (<3)	04 (03.3)	12 (10.0)
		Medium (3–5)	88 (73.3)	97 (80.9)
		High (>5)	28 (23.3)	11 (09.1)
		Average score	2.35	2.06
5.	Occupation	Agri. + dairy	93 (77.5)	103 (85.5)
		Other	27 (22.5)	19 (15.8)
6.	Land holding (ha)	landless (0)	05 (4.2)	04 (3.3)
		Marginal (<2)	47 (39.1)	61 (50.8)
		Small (2–4)	55 (45.8)	49 (40.8)
		Large (>4)	13 (10.8)	06 (05.0)
		Average score	2.35	2.06
7.	Dairy experience (years)	< 6	06 (05.0)	16 (13.3)
		6–12	38 (31.7)	51 (42.5)
		12–18	56 (46.7)	39 (32.5)
		>18	20 (16.7)	14 (11.7)
8.	Average herd size	Indigenous cow	1.84	1.74
		Crossbred cow	2.16	1.76
		Buffalo	4.896	3.876
9.	Av. milk production (litre/day)	Indigenous cow	2.52	2.30
		Cross bred cow	8.23	7.31
		Buffalo	5.32	4.67
10.	Total gross milk prod (litre/yr)	<10,000	79 (65.8)	90 (75.0)
		10,000–20,000	31 (25.8)	25 (20.8)
		>20,000	10 (8.3)	05 (4.1)
11.	Income from dairying (₹/yr)	Low (<20,000)	59 (49.2)	45 (37.5)
		Med. (20,000–60,000)	63 (52.5)	65 (54.2)
		High (>60,000)	08 (06.7)	10 (08.3)
12.	Annual gross income (₹)	Low (<80,000)	87 (72.5)	71 (59.2)
		Med.(80,000–160,000)	10 (8.3)	27 (32.5)
		High (>160,000)	23 (19.2)	22 (18.3)
13.	Labour unit	Low (<2)	68 (56.7)	88 (73.3)
		Medium (2–3)	51 (42.5)	31 (25.8)
		High (>3)	01 (0.8)	01 (0.8)

Figures in parentheses indicate percentage.

sources of risk by the dairy farmers.

Epidemic livestock diseases, marketing/sale risk and poor conception were perceived as significant sources of risks by the farmers. The farmers who insured their dairy animals perceived that feed cost variability, delay in treatment/AI, marketing/sale risk, poor conception and crop yield variability were major risk, whereas, major risk perceived by non-insured dairy farmers were marketing/sale risk, family health concerns, climate risk, poor conception, variability in milk price and changes in

production technology. The possible reasons observed are several that include lack of awareness, illiteracy, affordability, lack of delivery channels that provide access at the doorsteps, problem in claims settlements etc. Government should intensify its advertising efforts and inform dairy farmers about different sources of risk associated with dairying and the their management strategies taking into account the farmers' education level

Perception of risk management strategies: Dairy farmers' perception of risk management strategies –as

Table 2. Dairy farmers' perception of different sources of risks

Statements	Non-insured		Insured		Pooled (insured + non-insured)	
	Average score	SD	Average score	SD	Average score	SD
1. Livestock diseases (epidemic)	4.42	1.46	4.56	1.64	4.49	1.55
2. Variability in milk price	4.01	0.98	3.82	0.85	3.91	0.91
3. Variability in milk yield	3.61	0.70	3.68	0.77	3.64	0.73
4. Family health concerns	4.38	1.50	4.16	1.22	4.27	1.36
5. Climate risk	4.21	1.14	4.25	1.40	4.23	1.26
6. Marketing/sale	4.43	1.38	4.10	1.15	4.26	1.26
7. Price variability of livestock products	3.63	0.67	3.88	0.87	3.75	0.76
8. Cost of operating inputs	3.45	0.57	3.73	0.76	3.59	0.66
9. Feed cost variability	4.23	1.17	4.22	1.13	4.23	1.14
10. Forage yield uncertainty	3.54	0.63	3.51	0.68	3.53	0.64
11. Crop yield variability	3.95	1.02	4.01	0.94	3.98	0.98
12. Changes in production technology	3.88	0.76	3.90	0.99	3.89	0.85
13. Poor conception	4.34	1.31	4.23	1.16	4.29	1.23
14. Silent heat	3.78	0.73	3.75	0.85	3.76	0.77
15. Anoestrus	3.88	0.82	3.78	0.75	3.83	0.78
16. Delay in treatment/AI	4.01	0.95	4.17	1.10	4.09	1.02
17. Unavailability of veterinary doctor	3.92	0.81	3.54	0.60	3.73	0.69
18. Lack of extension agency support	3.58	0.64	3.50	0.55	3.54	0.58
19. Animal diseases (non-epidemic)	3.48	0.66	3.74	0.95	3.61	0.80
20. Consumer preferences	3.53	0.68	3.18	0.44	3.35	0.56
21. Changes of interests rate and ability to repay loans	3.18	0.55	4.04	1.26	3.61	0.88
22. Changes of agricultural policy	3.08	0.54	3.19	0.46	3.14	0.49
23. Property rights (enough own land and inheritance rights)	3.65	0.82	3.79	0.89	3.72	0.85
24. Lack of labor force (in or out family)	3.58	0.82	3.71	0.77	3.65	0.78
25. Environment policy	2.90	0.42	3.27	0.50	3.08	0.45
26. Burglary/theft etc	3.28	0.57	3.13	0.39	3.20	0.47
27. Injury, illness/death of farm operator	3.68	0.80	3.87	0.97	3.77	0.87
28. Animal welfare policy	3.11	0.51	3.16	0.41	3.13	0.45
29. Elimination of government support	2.98	0.36	3.13	0.51	3.05	0.42
30. Changes in farm capital	3.44	0.74	3.30	0.51	3.37	0.59

measured on a 5-point scale - are summarized in the Table 3. Strategies like ownership of agricultural land, having financial reserve, prevention of animal diseases, life insurance, off farm employment, good production technology, strict hygienic rule and livestock insurance were perceived to be relevant risk management strategies by non-insured dairy animal owners as the above statement had high average score than the neutral. The risk management strategies like price contract for input, stock of adequate material, leasing or renting of machine and sharing of equipment were not relevant as these strategies had lower value than the neutral. The most relevant risk management strategies for insured dairy animal owners were prevention (vaccination) of livestock diseases and livestock insurance. Since all the farmers in this category had insured their animals, it is obvious to find insurance of livestock to be the most relevant strategy for risk management for them. Other risk management strategies for insured dairy animal owners were carrying financial reserve, enterprise diversification, price contract from known buyers, life insurance, own agricultural land and consultancy services.

The respondents owning insured dairy animals perceived that price contract for input, labour force, stock of adequate material and cooperative marketing were not relevant risk management strategies as these strategies had lower value than the neutral.

The most relevant strategies across all the dairy farmers (in descending order) were vaccination of animals, owning agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. Epidemic livestock diseases, family health concerns, Climate risk, Marketing/sales risk, Feed cost variability, Poor conception and Delay in treatment/AI were relevant sources of risk to the dairy farmers. Consumer preferences, Changes of agricultural policy, Environment policy, Burglary/theft etc, Animal welfare policy, elimination of government support and changes in farm capital were less relevant sources of risk than the other sources of risk. Sources of risk like variability in milk price, crop yield variability, changes in production technology and anoestrus were most relevant with high level of consensus among the dairy farmers. The most relevant risk management strategy for the dairy

Table 3. Dairy farmers' perception of different sources of risk management strategies

Statements	Non-insured		Insured		Pooled (insured + non-insured)	
	Average score	SD	Average score	SD	Average score	SD
1. Carrying financial (cash) reserve	3.83	1.03	3.78	0.91	3.80	0.97
2. Enterprises diversification	3.17	0.65	3.46	0.70	3.31	0.67
3. Spreading sales of milk and milk products	2.91	0.38	3.31	0.55	3.11	0.46
4. Off-farm employment	3.47	0.68	3.56	0.62	3.51	0.65
5. Price contract for known buyers	3.28	0.52	3.43	0.60	3.36	0.56
6. Price contract for input	2.77	0.50	2.86	0.43	2.81	0.46
7. Livestock insurance	3.34	0.70	4.03	1.09	3.68	0.88
8. Life insurance	3.52	0.80	3.95	1.22	3.73	0.99
9. Crop insurance	3.18	0.60	3.26	0.52	3.22	0.55
10. Own agricultural land	3.96	1.16	3.66	0.75	3.81	0.94
11. Adequate production technology	3.47	0.73	3.54	0.66	3.50	0.69
12. Production at lowest possible cost	3.06	0.58	3.26	0.65	3.16	0.62
13. Consultancy services	3.13	0.51	3.37	0.60	3.25	0.54
14. Labour force (quality and quantity)	2.92	0.44	2.91	0.40	2.91	0.41
15. Stock of adequate material	2.86	0.45	2.76	0.42	2.81	0.42
16. Leasing or renting machinery	2.81	0.50	3.01	0.50	2.91	0.50
17. Applying strict hygienic rule	3.38	0.61	3.47	0.78	3.42	0.69
18. Prevent/reduce livestock diseases	3.83	0.86	4.08	1.05	3.95	0.95
19. Cooperative marketing	3.34	0.60	2.85	0.50	3.10	0.53
20. Keeping fixed cost low	3.07	0.54	3.26	0.63	3.16	0.58
21. Use of economic information and consultancy services	3.13	0.50	3.40	0.59	3.27	0.54
22. Shared equipment partnership	2.93	0.42	3.00	0.47	2.96	0.44

SD,

farmers were vaccination of animals, having own agricultural land, having financial reserve, life insurance, livestock insurance and off farm employment. The dairy farmers perceived that price contract for input, labour force, stock of adequate material, leasing or renting machinery and shared equipment partnership were not the relevant risk management strategies. The study revealed notable differences between insured and non-insured dairy farmers with respect to their risk perceptions and risk management strategies suggesting that government policies may have to be applied according to the need of the dairy farmers. Both groups of farmers were, however, worried about the different type of risks, indicating the importance of a livestock policy that is clear, stable and predictable. The results provided useful insights for policy makers, developers and advisors suggesting that they should consider the scope for strategic policy initiatives for risk management that give dairy farmers some greater confidence.

REFERENCES

- Ahsan D A. 2011. Farmers' motivation, risk perception and risk management strategies in developing economy: Bangladesh experience. *Journal of Risk Research* **14** (3): 325–49.
- Ahsan D A and Roth E. 2010. Farmers' perceived risks and risk management strategies in emerging mussels aquaculture industry in Denmark. *Marine Resource Economics* **25** (3): 309–23.
- Bardhan D and Tewari S K. 2007. Risk attitude and risk management strategies: An analysis of dairy farmers in Tarai area of Uttaranchal. *Indian Journal of Agricultural Economics* **62** (4): 607–22.
- Bihan V E, Pardo S and Guillotreau P. 2013. Risk Perception and Risk Management Strategies of Oyster Farmers. *Marine Resource Economics* **28** (3): 285–304.
- Chaudhary J K, Singh B, Prasad S and Verma M R. 2013. Analysis of morbidity and mortality rates in bovines in Himachal Pradesh. *Veterinary World* **6** (9): 614–19.
- Hardaker J B, Huirne R B M, Anderson J R and Lien G. 2004. *Coping with Risk in Agriculture*. 2nd edn, CAB Publishing, London, UK.
- Kumar G, Joshi P K, Datta K K and Singh S B. 2008. An assessment of economics losses due to Avian flu in Manipur state. *Agricultural Economics Research Review* **21** (1): 37–47.
- Mahajan S, Agarwal R, Kumar M, Mohan A and Pande N. 2013. Incidence of *Peste des petits ruminants* (PPR) in nomadic sheep and goat of Jammu region. *Veterinary World* **6** (7): 384–87.
- Meuwissen M P M, Huirne R B M and Hardaker J B. 2001. Risk and risk management: an empirical analysis of Dutch livestock farmers. *Livestock Production Science* **69** (1): 43–53.
- Pritchett J, Thilmany T and Johnson K. 2005. Animal Disease economic impact: A survey of literature and typology of research approaches. *International Food and Agribusiness Management Review* **8** (1): 23–45.
- Roslan N A, Abdullah A M, Ismail M M and Radam A. 2012. Determining risk attitudes of paddy farmers in KETARA Granary, Malaysia. *International Journal of Social Science and Humanity* **2** (3): 225–31.
- Singh B, Prasad S, Sinha D K and Verma M R. 2013. Estimation of economic losses due to Foot and Mouth Disease in India. *Indian Journal of Animal Sciences* **83** (9): 964–70.