The Pharma Innovation Journal 2020; 9(2): 172-175

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(2): 172-175

www.thepharmajournal.com
Received: 16-12-2019
Accepted: 19-01-2020

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Measurement of reproductive disorder remedial practice adoption (RDRPA) for curing infertility in dairy animals of Punjab

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DOI: https://doi.org/10.22271/tpi.2020.v9.i2d.4369

Abstract
The present study was conducted on 540 dairy farmers belonging to all the six different agro-climatic zones of Punjab by personal interview technique to assess Reproductive disorder remedial practice adoption (RDRPA) for curing infertility in dairy animals. The adoption rate was more for farmers running large dairy units followed by those running medium dairy units, then small dairy units. Unawareness and cost factor played a significant role in non-adoption. Adoption of remedial practices such as appropriate body weight, balanced diet feeding, comfortable housing, deworming, insemination by trained person significantly differ according to size of dairy units. There was significantly difference in mean RDRPA score of farmers running small, medium and large dairy units at $P<0.05$. The RDRPA level of farmers running small dairy units was low, while it was medium for those running medium and large dairy units and for overall dairy farmers of Punjab. The present study stresses formulation of farmer friendly, cost effective, easily understandable technologies for enhancing the adoption level.

Keywords: Adoption, Dairy, Farmer, Infertility, Punjab

Introduction
More than 70% Indian rural households has livestock (Birthal and Jha 2005, Misra *et al* 2007), but still there is a considerable debate on India's ability to maintain milk supplies to its growing population in the coming decades. Despite rapid advances in the animal husbandry technologies and their role in improving livestock sector, productivity of this sector is still very low in India (Chander *et al* 2010). Although, Punjab is one of the leading states in dairying and milk production, producing 11.86 Million tonnes of milk, of the total milk production of country which is 176.3 Million Tonnes (National Dairy Development report, 2017-18, https://www.nddb.coop/information/stats/milkprodstate). But, in Punjab, the average milk yield/animal/day is 6.52 Kg, 10.96 Kg, and 8.65 Kg in nondescript cows, crossbred cows, and buffaloes respectively (Anonymous 2015). Anoestrus, repeat breeding, cystic ovarian degeneration, uterine and tubal disorders have been observed as the most common gynaecological problems in cattle and buffaloes (Agarwal *et al* 2005). The reproductive disorders such as repeat breeding and anoestrus lead to lesser calves and milk production, long service period and increase in intercalving interval, thereby causing economic losses. Concisely, lesser the reproductive losses in a dairy farm, more is the profitability of the venture. To curtail these losses, various remedial measures are available. But, there is poor diffusion and adoption of livestock technologies at field level (Melesse *et al* 2013), which may result in to infertility. The maintaining of infertile animal at dairy farm is an economic burden on dairy owners. So, a study was planned for assessing adoption of remedial measures used for curing infertility in dairy animals of Punjab.

Materials and methods
The present study was conducted in whole of Punjab state. On the basis of agro climatic conditions, Punjab has been divided into six different zones (Mahi and Kingra, 2013), namely Sub mountain undulating zone (Zone I), Undulating plain zone (Zone II), Central plain zone (Zone III), Western plain zone (Zone IV), Western zone (Zone V), and Flood plain zone (Zone VI). From each agro-climatic zone, the respondents were randomly selected and were categorized in to three different categories of 30 farmers each i.e., Group I (small dairy unit with 1-9 animals), Group II (medium dairy unit with 10-30 animals) and Group III (large dairy

unit with more than 30animals). Thus, the total number of respondents was 90 in each agro-climatic zones. The overall number of farmers running small, medium and large dairy units were 180 each and total number of respondents belonging to different categories were 540. The data were collected through a pre-structured and pre-tested interview schedule by personal interview technique. Each respondent was interviewed separately to avoid influence of other opinions. After consultation with subject matter experts and scrutinizing research literature, total 10 reproductive disorders remedial practices were enlisted. The farmers were also questioned to know about the adoption of these practices. The various factors affecting adoption of these practices were noted and categorized in to unawareness, unavailability, cost factor and complexity of technology. The farmer adopting a particular practice was given score one while farmer not adopting technology was graded zero for that particular practice. The Reproductive disorder remedial practice adoption (RDRPA) score and level were calculated. Farmers having RDRPA score up to 3, ≥ 3-6 and more >6 were categorized in to low, medium and high RDRPA level. For analysis, simple tabular techniques and appropriate statistical methods were employed by using SPSS version 22.0.

Results and discussion

Table 1 depicts RDRPA status among dairy farmers of Punjab. The adoption rate about remedial measures was more for farmers running large dairy units followed by those running medium dairy units, then small dairy units. In an earlier study, it was also reported that there was significant difference (p<0.05) in RDRPA score of small and large dairy farmers in Undulating plain zone of Punjab (Kasrija *et al* 2016). Overall, analysis of Punjab indicated that unawareness and cost factor played a significant role in non-adoption of remedial measures. Unavailability and complexity of technology were also having some role in non-adoption. Sah and Chand (1999) stated that the lowest adoption in breeding practices may be due to complicated nature of some of the breeding practices.

Unawareness level was reported more in farmers running small dairy units. Raut *et al* (1989) also reported that there has been a wide gap between the extent of knowledge of improved dairying practices by the farmers and their actual adoption. Cost factor was also main hindrance for adoption. Ganai *et al* (2008) also reported that although the feed was available in the market, 74.80% of the farmers could not afford to purchase the feeds due to the high costs. It can be concluded from forgoing that unawareness and cost factor are major hindrance for adoption of remedial measure for curtailing infertility. So, the need of hour is to formulate cost-effective and easily understandable technologies so as to enhance the adoption level.

Table 2 describes Chi square values of Logistic regression of RDRPA for different dairy units. On multinomial logistic regression analysis it was found that remedial measures bearing (*) significantly differ according to size of dairy units in different zones. Overall analysis of Punjab indicated that adoption of remedial practices such as appropriate body weight, balanced diet feeding, comfortable housing, deworming, insemination by trained person significantly differ according to size of dairy units.

Table 3 and Figure 1 describe RADRPA score and level among dairy farmers of different zones of Punjab. There was significant difference in mean RDRPA score of Zone I and III at P<0.05. The RDRPA level was low for zone I, while it was medium for rest of zones and for overall Punjab. It suggests that adoption score of remedial practice used for curing infertility varies from zone to zone. So, a single policy for whole of the state should not be formulated. Singh and Gill (1993) also reported that the adoption of dairy technologies varies from region to region depending on various factors.

Table 1: RDRPA status among dairy farmers of Punjab

Dairy unit	Adoption status		Remedial measure practice									
			Appropriate body weight	Feeding ration to heifer	Balanced diet feeding	Mineral mixture feeding	Comfortable housing	Deworming	Insemination by trained person	Right time of insemination	Hormonal treatment	Intrauterine treatment
Small (n=180)	Adopted		9 (5)	29 (16.11)	39 (21.67)	46 (25.56)	29 (16.11)	74 (41.11)	127 (70.56)	57 (31.67)	14 (7.78)	43 (23.89)
	Non adopted	Unawareness	113 (62.78)	78 (43.33)	73 (40.56)	91 (50.55)	93 (51.67)	92 (51.11)	53 (29.44)	111 (61.67)	61 (33.89)	83 (46.11)
		Cost factor	58 (32.22)	72 (40.0)	59 (32.78)	42 (23.33)	51 (28.33)	14 (7.78)	0 (0)	0 (0)	48 (26.67)	26 (14.44)
		Unavailability	0 (0)	1 (0.56)	0 (0)	1 (0.56)	0 (0)	0 (0)	0 (0)	10 (5.55)	19 (10.55)	10 (5.55)
		Complexity of technology	0 (0)	0 (0)	9 (5)	0 (0)	7 (3.89)	0 (0)	0 (0)	2 (1.11)	38 (21.11)	18 (10.0)
Medium (n=180)	Adopted		28 (15.56)	43 (23.89)	59 (32.78)	62 (34.44)	44 (24.44)	96 (53.33)	116 (64.44)	62 (34.44)	24 (13.33)	63 (35.0)
	Non adopted	Unawareness	95 (52.78)	80 (44.44)	63 (35.0)	72 (40.0)	85 (47.22)	69 (38.33)	64 (35.55)	108 (60)	54 (30.0)	83 (46.11)
		Cost factor	57 (31.67)	57 (31.67)	49 (27.22)	44 (24.44)	41 (22.78)	15 (8.33)	0 (0)	0 (0)	40 (22.22)	16 (8.89)
		Unavailability	0 (0)	0 (0)	0 (0)	2 (1.11)	0 (0)	0 (0)	0 (0)	10 (5.55)	16 (8.89)	8 (4.44)
		Complexity of technology	0 (0)	0 (0)	9 (5)	0 (0)	10 (5.55)	0 (0)	0 (0)	0 (0)	46 (25.55)	10 (5.55)
Large (n=180)	Adopted		57 (31.67)	59 (32.78)	108 (60.0)	74 (41.11)	75 (41.67)	120 (66.67)	111 (61.67)	83 (46.11)	34 (18.89)	80 (44.44)
	Non adopted	Unawareness	57 (31.67)	73 (40.56)	52 (28.89)	68 (37.78)	74 (41.11)	54 (30.0)	68 (37.78)	87 (48.33)	55 (30.55)	75 (41.67)
		Cost factor	65 (36.11)	48 (26.67)	14 (7.78)	36 (20.0)	19 (10.55)	6(0.03)	0 (0)	0 (0)	35 (19.44)	15 (8.33)
		Unavailability	0 (0)	0 (0)	0 (0)	2 (1.11)	0 (0)	0 (0)	1 (0.56)	8 (4.44)	14 (7.78)	0 (0)
		Complexity of technology	1 (0.56)	0 (0)	6 (3.33)	0 (0)	12 (6.67)	0 (0)	0 (0)	2 (1.11)	42 (23.33)	10 (5.55)
Over all (n=540)	Adopted		94 (17.41)	131 (24.26)	206 (38.15)	182 (33.70)	148 (27.41)	290 (53.70)	354 (65.56)	202 (37.41)	72 (13.33)	186 (34.44)
	Non adopted	Unawareness	265 (49.07)	231 (42.78)	188 (34.81)	231 (42.78)	252 (46.67)	215 (39.81)	185 (34.26)	306 (56.67)	170 (31.48)	241 (44.63)
		Cost factor	180 (40)	177 (32.78)	122 (25.59)	122 (25.59)	111 (20.55)	35 (6.48)	0 (0)	0 (0)	123 (22.78)	57 (10.56)
		Unavailability	0 (0)	1 (0.19)	0 (0)	5 (0.009)	0 (0)	0 (0)	1 (0.19)	28 (5.19)	49 (9.07)	18 (3.33)
		Complexity of technology	1 (0.19)	0 (0)	24 (4.44)	0 (0)	29 (5.37)	0 (0)	0 (0)	4 (0.74)	126 (23.33)	38 (7.04)

Figure in parenthesis indicate percentage

Table 2: Chi square values of Logistic regression of RDRPA for different dairy units

Sr. No.	Remedial practice	Agroclimatic zones						Overall
		Sub mountain undulating	Undulating plain	Central plain	Western plain	Western	Flood plain	
1	Appropriate body weight	4.637	5.419	2.088	23.432*	9.132*	10.421*	38.765*
2	Feeding ration to heifer	3.665	8.087	0.034*	0.221	0.318	2.939	4.574
3	Balanced diet feeding	9.143*	19.095	1.969*	2.565	9.062*	11.589*	34.137*
4	Mineral mixture feeding	0.475	1.768	0.068	0.171	0.116	5.014	0.826
5	Comfortable housing	2.263	5.211	2.968	9.729*	0.801	1.871	12.065*
6	Deworming	1.566	4.304	0.919	6.654*	2.142	3.473	11.972*
7	Insemination by trained person	1.035	2.501	10.895*	26.444*	1.103	5.892	20.919*
8	Right time of insemination	1.548	0.625	0.046	19.592*	1.659	0.354	1.948
9	Hormonal treatment	1.864	0.566	0.336	2.005	0.911	0.181	0.131
10	Intrauterine treatment	0.840	1.201	2.804	5.941	1.217	0.070	2.853

(*) Practice significantly differ according to size of dairy unit

Table 3: RADRPA score and level among dairy farmers of different zones of Punjab

Zone number	Agroclimatic zone	RADRPA score (Mean ± S.E)	RADRPA level
I	Sub mountain undulating (n=90)	$2.98^{a} \pm 0.21$	Low
II	Undulating plain (n=90)	$3.33^{ab} \pm 0.19$	Medium
III	Central plain (n=90)	$4.20^{c} \pm 0.26$	Medium
IV	Western plain (n=90)	$3.56^{bc} \pm 0.22$	Medium
V	Western region (n=90)	$3.42^{ab} \pm 0.26$	Medium
VI	Flood plain (n=90)	$3.26^{ab} \pm 0.22$	Medium
Over all (n=540)		3.46 ± 0.09	Medium

Values with different superscript differ significantly at $P< 0.05$

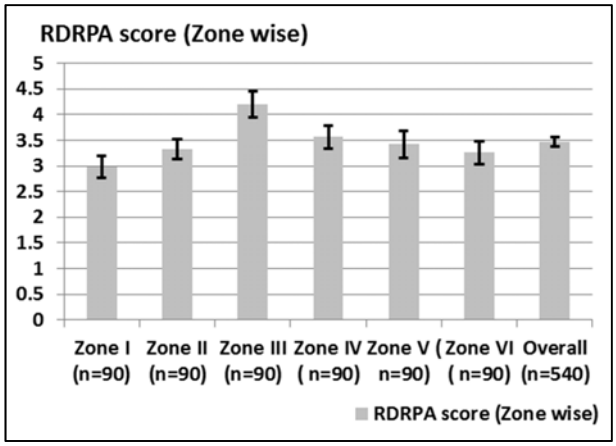

Fig 1: RDRPA score in different zones of Punjab

Table 4 and Figure 2 describe RADRPA score and level among dairy farmers of Punjab. There was significantly difference in mean RDRPA score of farmers running small, medium and large dairy units at $P<0.05$. The RDRPA level of farmers running small dairy units was low, while it was medium for those running medium and large dairy units and for overall dairy farmers of Punjab.

Table 4: RADRPA score and level among dairy farmers of Punjab

Dairy unit	RADRPA score (Mean ± S.E)	RADRPA level
Small (n=180)	$2.59^{a}\pm 0.15$	Low
Medium (n=180)	$3.29^{b} \pm 0.15$	Medium
Large (n=180)	$4.49^{c} \pm 0.16$	Medium
Over all (n=540)	3.46 ± 0.09	Medium

Values with different superscript differ significantly at $P< 0.05$

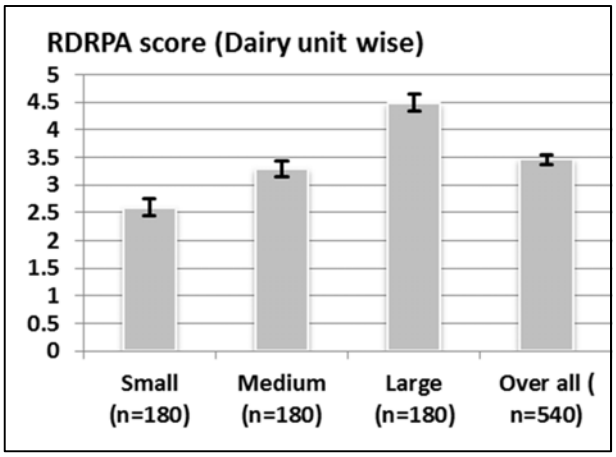

Fig 2

Table 5 represents correlation coefficient 'r' value of RDRPA with demographic and communicational profile in Punjab. The RDRPA score was significantly correlated with education, land holding, training, mass media exposure and extension contacts at 0.01 level (2-tailed). This means that farmers having more education level had more RDRPA i.e. adopted more remedial measures for reproductive disorders. Farmers having more land holding had more approach to resources for more

RDRPA. More the mass media exposure and extension contacts, more the RDRPA level. This indicates that extension agencies can play a vital role in knowledge dissemination and adoption of a technology.

Also, RDRPA increases by increase in training, mass media exposure, social participation and extension contacts. Sarkar (1981) also reported that adoption level of dairy farmers was highly significantly associated with their family education status, dairy farm income, herd size, average lactation yield and risk preferences. The adoption level was significantly related with land holding and social participation. However, Sheron and Kumar (1988) reported that extension contacts were not found to have significant relationship with feeding and management but it has negative and highly significant correlation with breeding, healthcare and overall adoption. But, Singh (1991) reported a positive and significant correlation of land holding, family education status, herd size, milk production and mass media exposure with adoption of improved dairy husbandry practices.

Table 5: Correlation coefficient 'r' value of RDRPA with demographic and communicational profile in Punjab

Pearson's correlation coefficient 'r'	RDRPA score	Age	Education	Family size	Land holding	Training	Mass media exposure	Social participation	Extension contact
RDRPA score	1	0.01	0.594**	0.017	0.420**	0.558**	0.604**	0.623**	0.608**
Age	0.01	1	0.044	0.233**	-0.025	-0.043	0.051	0.029	0.074
Education	0.594**	0.044	1	0.073	0.437**	0.484**	0.664**	0.690**	0.697**
Family size	0.017	0.233**	0.073	1	-0.032	0.005	0.069	0.066	0.063
Land holding	0.420**	-0.025	0.437**	-0.032	1	0.405**	0.509**	0.506**	0.529**
Training	0.558**	-0.043	0.484**	0.005	0.405**	1	0.506**	0.496**	0.505**
Mass media exposure	0.604**	0.051	0.664**	0.069	0.509**	0.506**	1	0.921**	0.907**
Social participation	0.623**	0.029	0.690**	0.066	0.506**	0.496**	0.921**	1	0.909**
Extension contact	0.608**	0.074	0.697**	0.063	0.529**	0.505**	0.907**	0.909**	1

(**) Correlation is significant at the 0.01 level (2-tailed).

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