

## INVESTIGATING (DIS)EMPOWERING ATTITUDES AND BEHAVIORS OF WOMEN DAIRY FARMERS AND THE EFFECTS OF THE THREE INTERVENTION (CD, WDCLP, AND WDP) PROGRAMS IN THE KOLHAPUR AND JAIPUR DISTRICT MILK UNIONS IN INDIA.

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### Abstract

In the present investigation, we applied multivariate data-analysis techniques to gain a keener understanding of the underlying structure of the knowledge, attitudinal, and behavioral dimensions of empowerment, specific to the context of women dairy farmers in India. Our data-analyses techniques helped us significantly reduce our large survey data-set in a conceptually meaningful way, leading to the creation of eight new composite scaled variables, each signifying an empowerment dimension. Each newly-constructed composite scale had multiple measures, high construct and face validity, and high reliability. Further, these scaled measures of empowerment provided a basis to compare and contrast the relative effects of the three intervention (CD, WDCLP, and WDP) programs in the Kolhapur and Jaipur District Milk Unions. Our present investigation holds some implications for women and dairying policy-makers, development practitioners, and scholars of social change.

### Project Background

In recent years, women dairy farmers have become a primary target group for two NDDB-supported educational/training programs, the Cooperative Development (CD) Program and the Women's Dairy Cooperative Leadership Program (WDCLP). In addition, the Ministry of Human Resource Development (HRD)

supports the Women's Dairy Project (WDP) in several states of India. The broad purpose of the present research project was to compare and contrast the relative effects of these three intervention (CD, WDCLP, and WDP) programs in empowering women dairy farmers in two regions of India - Kolhapur in Maharashtra and Jaipur in Rajasthan (see Singh, Ahmed, Rogers, & Singhal, 1994 for details of the project proposal). An additional purpose was to gain insights into the nature of women's empowerment processes, including some of the attitudinal and behavioral dimensions of empowerment, specific to the context of women dairy farmers in India.

The present research project was funded in 1995 by the Ford Foundation in New Delhi through a grant made to the National Dairy Development Board (NDDB). Two U.S.-based institutions, Ohio University (where one of the present authors Singhal is based) and the University of New Mexico (where Professor Everett M. Rogers is based) served as collaborating institutions. Two NDDB officials, Mr. D.V. Ghanekar and Mr. Arun Wayangankar, earned their MA degrees at Ohio University and at the University of New Mexico under the supervision of Professor Singhal and Rogers, respectively.

Various types of quantitative and qualitative data for the present research project were gathered in India in 1996 in the Kolhapur and Jaipur District Milk Unions. Table I provides a village-wise summary of the primary data-collected on the above three intervention programs (CD, WDCLP, and WDP) in the Kolhapur and Jaipur District Milk Unions. Several background documents on the present research project, including a detailed description of the project's research planning process (see Singhal, 1999) and the conceptual framework of empowerment, field operational plan, and research instruments (see Singhal, 1999a), were compiled by our research team at Ohio University. In addition, key findings of the present research project have been reported in (1) Mr. D.V. Ghanekar's MA thesis at Ohio University (Ghanekar, 1997), which analyzed the impact of the three women dairy farmers'

empowerment (CD, WDCLP, and WDP) programs in intervention versus control villages, (2) the Papa, Singhal, and Ghanekar (1999) report, which qualitatively investigated the empowering and disempowering dimensions in the communication of women dairy farmers, and (3) the Rogers and Mahotra (1999) report, which investigated the relationship between the adoption of dairying innovations by women dairy farmers and their empowerment.

### **Purpose**

The purpose of the present report is to further analyze the quantitative data that was collected during 1996, following-up on the analysis conducted by Ghanekar (1997) in his MA thesis at Ohio University, to compare and contrast the relative effects of these three intervention (CD, WDCLP, and WDP) programs in empowering women dairy farmers in the Kolhapur and Jaipur District Milk Unions. Additional insights about the process of empowerment of women dairy farmers are gleaned here through the utilization of more sophisticated and multivariate data-analysis techniques.

In previously-conducted data-analyses, Ghanekar (1997) reported that women dairy farmers who had participated in women's educational and training programs, such as the CD, WDCLP, and WDP programs, in general, displayed higher levels of knowledge, more positive attitudes, and more empowering behaviors with respect to desired dairying practices and cooperative governance when compared to women dairy farmers who had not participated in these intervention programs. That is, women dairy farmers who had participated in an intervention program were somewhat more "empowered" (knowledge-wise, attitudinally, and behaviorally) than those who were not exposed to these interventions. As is quite appropriate with preliminary quantitative data-analysis, reported in Ghanekar (1997), various knowledge, attitudinal, and behavioral measures in the survey responses were simply summed for each respondent, and the combined means of for each

aggregated knowledge, attitudinal, and behavioral measure for respondents in the intervention groups were compared with those of the control groups.

Here we employ somewhat more sophisticated quantitative data-analyses procedures to tease out, by applying multivariate data-analysis techniques like factor analysis, the underlying dimensions of the knowledge, attitudinal, and behavioral practices associated with empowerment, and then compare and contrast the relative effects of the three intervention (CD, WDCLP, and WDP) programs along these various knowledge, attitudinal, and behavioral dimensions in the Kolhapur and Jaipur District Milk Unions.

### **Research Questions**

Our present investigation was organized around the following nine research questions:

#### **Research Question #1:**

To what extent could the several variables that measured women dairy farmers' knowledge with respect to sound dairying practices be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

#### **Research Question #2:**

To what extent could the several variables that measured women dairy farmers' attitudes about their role in the dairying enterprise be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

#### **Research Question #3:**

To what extent could the several variables that measured women

dairy farmers' practice of empowered behaviors be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

Research questions #4 through #9 assess the differences among women dairy farmers who participated in the three intervention (CD, WDCLP, and WDP) programs in the Kolhapur and Jaipur regions of our study versus those who did not. The knowledge, attitudinal, and behavioral dimensions of empowerment listed in research questions #4 through #9 were identified in our investigation of research questions #1 to #3 (as we detail later).

**Research Question #4:**

Did women dairy farmers of Kolhapur who underwent the CD training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

**Research Question #5:**

Did women dairy farmers of Kolhapur who underwent the WDCLP training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

**Research Question #6:**

Were there any significant differences between the women dairy farmers of Kolhapur who underwent the CD training program and the WDCLP program in terms of their (1) knowledge levels about milk hygiene techniques; their attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and their empowering behaviors related (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices?

**Research Question #7:**

Did women dairy farmers of Jaipur who underwent the CD training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

**Research Question #8:**

Did women dairy farmers of Jaipur who underwent the WDP training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

### **Research Question #9:**

Were there any significant differences between the women dairy farmers of Jaipur who underwent the CD training program and the WDP program in terms of their (1) knowledge levels about milk hygiene techniques; their attitudes (2) about bolstering their intrinsic capabilities, and (3) about being mobile outside of their homes; and their empowering behaviors related (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices?

### **Method and Data-Collection**

The detailed method and data-collection procedures, including the design of the survey instrument and the selection criteria of the intervention (CD, WDCLP, and WDP) and control villages in Kolhapur and Jaipur Districts, have been described previously in Ghanekar (1997); Papa, Singhal, and Ghanekar (1999); Singhal (1999, 1999a); and Rogers and Malhotra (1999), and hence only summarized here. Various types of data on the empowerment of women dairy farmers was gathered through personal survey interviews, in-depth interviews, focus group interviews, and other archival means in both the Kolhapur and Jaipur District Milk Unions. The research instruments were translated into local languages (Marathi in Kolhapur and Marwadi in Jaipur), pre-tested, and refined several times prior to administration. In the Kolhapur region, data were collected from women dairy farmers in nine villages: Three villages where the Cooperative Development (CD) program was implemented; three villages where the Women's Dairy Cooperative Leadership Program (WDCLP) was implemented; and three control villages, which had not received either the CD or the WDCLP intervention (see Table 1). In the Jaipur region, data were also collected from women dairy farmers in nine villages: Three villages where the Cooperative Development (CD) program was implemented; three villages where the Women's Dairy Project (WDP) was implemented; and three

control villages, which had not received either the CD or the WDP intervention (see Table 1). The sample size in both the Kolhapur and Jaipur research sites were 180 women dairy farmers, respectively (that is, 20 respondents in each of the intervention and control villages), making a total N of 360 respondents.

### **Our Quantitative Data-analyses Proceeded as Follows:**

1. We used the multivariate statistical technique of factor analysis on the survey responses provided to the (a) knowledge, (b) attitudinal, and (3) behavioral items associated with desired dairying practices to examine the underlying patterns/dimensions in these variables. The primary purpose of conducting factor analysis is data reduction and summarization (Hair, Anderson, & Tatham, 1987). Factor analysis helps analyze the interrelationship among a large number of variables, explaining these variables in terms of common underlying themes or dimensions (referred to as factors). This technique is especially useful in condensing (or summarizing) the information contained in a number of original variables into a smaller set of new composite dimensions with a minimum loss of information (Hair, Anderson, & Tatham, 1987). For instance, as we detail later, our survey respondents provided information on the degree to which they practiced 33 different overt behaviors related to dairying and cooperative governance. By factor analyzing these 33 original variables, we were able to tease out five new composite behavioral dimensions relating to dairying and cooperative governance, which greatly facilitated comparison-making across women dairy farmers of the three intervention programs in our two regions of study. Imagine comparing women dairy farmers on each of the 33 behavioral dimensions across the three intervention programs and two regions! Or imagine aggregating all 33 behavioral dimensions into a single composite variable without understanding the underlying conceptual structure or interrelationships between these variables!
2. After identifying the underlying factor structures and loadings on the survey responses provided to the (a) knowledge, (b)

attitudinal, and (3) behavioral items associated with empowered dairying practices, we constructed several new composite knowledge, attitudinal, and behavioral scales, ensuring that the new scaled measures displayed construct and face validity. The reliability of each of the scales was determined by computing the Cronbach alpha (a measure of scale reliability). A high Cronbach alpha is indicative of high intercorrelations and internal consistency among the various scaled items.

3. For each scaled measure of knowledge, attitude, and behavior related to desired dairying practices and cooperative governance, we used one-way ANOVA (analysis of variance) to assess differences between women dairy farmers who had participated in the intervention program versus those in the control villages in each of our research sites.

### **Underlying Knowledge Dimensions**

*Research Question #1 asked:* To what extent could the several variables that measured women dairy farmers' knowledge with respect to sound dairying practices be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

Principal components factor analysis was conducted on the responses provided to the 11 knowledge items in the survey to understand the underlying patterns/dimensions in the women dairy farmers' knowledge related to producing clean milk. One seven-item factor emerged from the factor analysis with factor loadings ranging between 0.46 and 0.77 (Table 2). The new composite factor was conceptually labeled as "Knowledge of milk hygiene techniques"; it accounted for 28 percent of the variance. The Cronbach's alpha coefficient for this seven-item composite knowledge scale was computed at 0.74, which indicates a highly reliable scale (Table 3)

### **Underlying Attitudinal Dimensions**

*Research Question #2 asked:* To what extent could the several variables that measured women dairy farmers' attitudes about their role in the dairying enterprise be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

Principal components factor analysis with varimax rotation was conducted on the responses provided to the 19 attitudinal items in the survey to understand the underlying patterns/dimensions in the women dairy farmers' attitudes that facilitated/hindered the practice of desired empowering behaviors. Two factors emerged from the factor analysis with factor loadings ranging between 0.72 and 0.79 for Factor 1, and loadings of .68 and .76 for Factor 2 (Table 4). Interestingly, both these factors contained attitudinal items that serve as hindrances to a woman's behavioral empowerment. The new composite three-item Factor 1 was conceptually labeled as women's "attitudes about stifling their intrinsic capabilities"; it accounted for 23 percent of the variance. The Cronbach's alpha coefficient for this three-item composite attitudinal scale was computed at 0.45 (Table 5). The new composite three-item Factor 2 was conceptually labeled as women's "attitudes about being grounded in their homes"; it accounted for 11 percent of the variance. The Cronbach's alpha coefficient for this three-item composite attitudinal scale was computed at 0.51 (see Table 5). Descriptive statistics for the two factors are also reported in Table 5. They suggest that women dairy farmers, in general, displayed more positive attitudes about bolstering their intrinsic capabilities than about enhancing their mobility outside of their homes.

### **Underlying Behavioural Dimensions**

*Research Question #3 asked:* To what extent could the several variables that measured women dairy farmers' practice of

empowered behaviours be condensed into a smaller set of new composite variables, based on their interrelationship with each other? Could reliable scale(s) of these new composite variables be constructed?

Principal components factor analysis with varimax rotation was conducted on the responses provided to the 33 behavioral items in the survey to understand the underlying patterns/dimensions in the women dairy farmers' practice of empowering behaviours. Five factors emerged (Table 6). The new composite six-item Factor 1 was conceptually labeled as women's "behaviors to initiate social change activities" (Table 7); its factor loadings ranged from 0.53 to 0.75 and it accounted for 17.3 percent of the variance (see Table 6). The Cronbach's alpha coefficient for this six-item composite behavioral scale was computed at 0.85 (Table 8).

The new composite three-item Factor 2 was conceptually labeled as women's "behaviors to launch collective activities" (Table 7); its factor loadings ranged from 0.58 to 0.87 and it accounted for 7.8 percent of the variance (see Table 6). The Cronbach's alpha coefficient for this three-item composite behavioral scale was computed at 0.77 (Table 8).

The new composite three-item Factor 3 was conceptually labeled as women's "behaviors to communicate assertively" (Table 7); its factor loadings ranged from 0.35 to 0.78 and it accounted for 5.9 percent of the variance (see Table 6). The Cronbach's alpha coefficient for this three-item composite behavioral scale was computed at 0.87 (Table 8).

The new composite three-item Factor 4 was conceptually labeled as women's "behaviors to personally control finances and time" (Table 7); its factor loadings ranged from 0.68 to 0.86 and it accounted for 5.6 percent of the variance (see Table 6). The Cronbach's alpha coefficient for this three-item composite behavioral scale was computed at 0.67 (Table 8).

The new composite four-item Factor 5 was conceptually labeled as

women's "behaviors to engage in responsible milk sales practices" (Table 7); its factor loadings ranged from 0.34 to 0.67 and it accounted for 4.3 percent of the variance (see Table 6). The Cronbach's alpha coefficient for this four-item composite behavioral scale was computed at 0.52 (Table 8).

Descriptive statistics for the five behavioral factors are reported in Table 8. The relatively high Cronbach alpha coefficient levels, suggest that the newly-constructed behavioral scales are highly reliable.

For each newly-constructed scaled measure of knowledge, attitude, and empowering behaviors that we compiled in this section, we compare, in the next section, the differences between women dairy farmers in the intervention villages versus those in the control villages in both the Kolhapur and Jaipur District Milk Unions using the statistical technique of one-way ANOVA (analysis of variance).

### **Effects of the CD and WDCLP Programs in Kolhapur**

*Research Question #4 asked:* Did women dairy farmers of Kolhapur who underwent the CD training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities, and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

The results of the one-way ANOVA reported in Table 9 show that women dairy farmers of Kolhapur who underwent the CD training program differed significantly from those who did not undergo the training program in only one out of the eight empowerment dimensions. They reported communicating more assertively than their non-trained counterparts.

*Research Question #5 asked:* Did women dairy farmers of Kolhapur who underwent the WDCLP training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities, and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

The results of the one-way ANOVA reported in Table 9 show that women dairy farmers of Kolhapur who underwent the WDCLP training program differed significantly from those who did not undergo the training program in three out of the eight empowerment dimensions. The WDCLP-trained women dairy farmers in Kolhapur reported launching more collective women's activities, communicating more assertively, and taking greater control of their finances and time as compared to their non-trained counterparts.

*Research Question #6 asked:* Were there any significant differences between the women dairy farmers of Kolhapur who underwent the CD training program and the WDCLP program in terms of their (1) knowledge levels about milk hygiene techniques; their attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and their empowering behaviors related (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices?

The results of the one-way ANOVA reported in Table 9 show that women dairy farmers of Kolhapur who underwent the WDCLP training program fared significantly better than those who had undergone the CD training program on one empowerment dimension only. The WDCLP-trained women reported launching

more collective women's activities. Similarly, women dairy farmers who underwent the CD training program fared significantly better than the WDCLP-trained women on one empowerment dimension also; they reported practicing more responsible behaviors related to milk sales. However, as is clear from answers to research questions #4 and #5, the WDCLP-trained women dairy farmers in Kolhapur reported somewhat more empowered behaviors (see Table 9) than the CD-trained women, at least relative to the women dairy farmers in the control villages.

### **Effects of the CD and WDP Programs in Jaipur**

*Research Question #7 asked:* Did women dairy farmers of Jaipur who underwent the CD training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

The results of the one-way ANOVA reported in Table 10 show that women dairy farmers of Jaipur who underwent the CD training program differed significantly from those who did not undergo the training program in only two out of the eight empowerment dimensions. That is, they demonstrated more positive attitudes about being mobile outside of their homes, and reported communicating more assertively as compared to their non-trained counterparts.

*Research Question #8 asked:* Did women dairy farmers of Jaipur who underwent the WDP training program demonstrate (1) higher levels of knowledge about milk hygiene techniques; more positive attitudes (2) about bolstering their intrinsic capabilities; and (3) about being mobile outside of their homes; and more empowering

behaviors (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices than women dairy farmers who did not undergo the training program?

The results of the one-way ANOVA reported in Table 10 show that women dairy farmers of Jaipur who underwent the WDP training program differed significantly from those who did not undergo the training program in a whopping seven out of the eight empowerment dimensions. Except for the knowledge scale, where no significant differences were found, the WDP-trained women dairy farmers in Jaipur displayed more positive attitudes on both the attitudinal dimensions and all the five dimensions of behavioral empowerment, as compared to their non-trained counterparts.

*Research Question #9 asked:* Were there any significant differences between the women dairy farmers of Jaipur who underwent the CD training program and the WDP program in terms of their (1) knowledge levels about milk hygiene techniques; their attitudes (2) about bolstering their intrinsic capabilities, and (3) about being mobile outside of their homes; and their empowering behaviors related (4) to initiate social change activities, (5) to launch collective activities, (6) to communicate assertively, (7) to personally control their finances and time, and (8) to engage in responsible milk sales practices?

The results of the one-way ANOVA reported in Table 10 show that women dairy farmers of Jaipur who underwent the WDP training program fared significantly better than those who had undergone the CD training program in six out of the eight empowerment dimensions. Except for the knowledge scale and one attitudinal dimension (dealing with women's mobility outside of their homes), where no significant differences were found, the WDP-trained women dairy farmers in Jaipur displayed more positive attitudes about bolstering their intrinsic capabilities, as well as all the five

dimensions of behavioral empowerment, compared to their CD-trained counterparts.

### **Discussion and Conclusions**

In the present investigation, we applied certain multivariate data-analysis techniques, such as factor analysis, to gain a keener understanding of the underlying structure of certain knowledge, attitudinal, and behavioral dimensions of empowerment. Our data-analyses techniques helped us significantly reduce our survey data-set in a conceptually meaningful way, with a minimum loss of information. We reduced some 63 disparate knowledge, attitudinal, and behavioral variables from our survey into eight new composite scaled variables, each signifying a certain empowerment dimension. Each newly-constructed composite scale had multiple measures, high construct and face validity, and high reliability, which helped elevate the conceptual and methodological rigor of our present investigation. Further, these scaled measures of empowerment provided a basis to compare and contrast the relative effects of the three intervention (CD, WDCLP, and WDP) programs in the Kolhapur and Jaipur District Milk Unions.

What are the implications of our findings? By using multivariate data-analysis techniques like factor analysis, we have made a modest beginning in quantitatively discerning some of the underlying patterns/dimensions of the knowledge, attitudinal, and behavioral variables that are associated with the empowerment or disempowerment of women dairy farmers in India. For instance, our data-analyses suggests that women's attitudes that "stifle their intrinsic capabilities" (e.g. they not feeling comfortable speaking in the presence of men) or that "ground them at home" (such as they not feeling comfortable pouring milk in the dairy cooperative), can represent socially-significant hinderances to their empowerment. Further, our data-analyses also unraveled some of the salient behavioral dimensions of empowerment, including their constituent elements which are specific to the context of women dairy farmers in India. For instance, behavioral empowerment in the context of



women dairy farmers in India includes behaviors geared toward "initiating social change activities" (e.g. participating in adult literacy programs, demanding remunerative prices for milk or regular payments, and others), behaviors geared toward "launching collective women's activities" (e.g. participation in a mahila mandal, launching collaborative business enterprise, etc.), behaviors geared to communicating more assertively (e.g. speaking to husband about transferring dairy membership, or speaking out at the annual general body meeting of the dairy cooperative society, etc.), behaviors geared toward gaining greater control of finances and time (e.g. holding a personal bank account, distribution of household workload, etc.), and behaviors related to responsible milk sales (e.g. not selling milk to private vendor, regularly pouring milk to the dairy cooperative society, regular collection of milk payments, etc.).

Clearly, a better understanding of the attitudinal and behavioral dimensions of empowerment, that are specific to the context of women dairy farmers in India, has important implications for women and cooperative policy-making, for subsequent intervention and programmatic planning, and for subsequent research and evaluation of these programs.

Our comparison of the three intervention (CD, WDCLP, and WDP) programs in the Kolhapur and Jaipur District Milk Unions of India also yielded additional insights. In Kolhapur District, the WDCLP as well as the CD-trained women dairy farmers seemed to report somewhat more empowered behaviors than women dairy farmers in the control villages, but not on a majority of the empowering dimensions that were investigated. An explanation could be that women dairy farmers in Kolhapur, including those in the control villages, enjoy a relatively more socially "empowered" status to begin with. Another explanation could be that the effects of the intervention programs, especially of the CD program in Kolhapur (given that the WDCLP-trained women reported somewhat more empowered behaviors), have been limited, and need appropriate fine-tuning.

In Jaipur District, both the WDP as well as the CD-trained women

dairy farmers seemed to report more empowered behaviors than women dairy farmers in the control villages. What stood out in this analysis was that the WDP-trained women dairy farmers displayed far more positive attitudes and reported practicing far more empowering behaviors (in all the five behavioral dimensions) than the CD-trained women. In essence, with respect to fostering empowering attitudes and behavioral practices, the WDP program seems to have made a significant impact in the Jaipur District. One explanation for WDP's relative effectiveness may be that it is an intervention program that is exclusively targeted to empowering women dairy farmers, who are organized in all-women's dairy cooperatives (such is not the case with the CD program which targets both men and women, often organized in mixed cooperatives). The WDP program also specifically imparts literacy, hygiene, and income-generation training to women dairy farmers, which perhaps helps raise their efficacy in domains both within and outside the dairy sector.

Our investigation of the relative effects of the three intervention (CD, WDCLP, and WDP) programs targeted to women dairy farmers also hold several policy-making, programmatic, and research implications. For instance, the relative effectiveness of the WDP program may point to the need of even more aggressively targeting women dairy farmers, especially those organized in all-women's dairy cooperatives. Also, a more concerted effort can be made to supplement the ongoing dairy-enhancement training programs with literacy, hygiene, sanitation, and income-generating initiatives for greater impact.

As women-centered grassroots-based development organizing movements (such as the CD, WDCLP, and the WDP program) increase in strength and intensity worldwide, important lessons will be lurking for policy-makers, practitioners, and scholars about how women are, and can be, empowered more humanely, justly, and sustainably. We hope the present investigation, with its strengths and limitations, has yielded some lessons and insights in this important realm of social organizing.

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**Table 1**  
**Primary Data Collected in the Kolhapur and Jaipur Milk Unions**

Intervention/Control Research Sites	Name of Village	No. of Survey Interviews	No. of In-depth Interviews Women	No. of In-depth Interviews Men
<b>KOLHAPUR MILK UNION</b>	CD1	20	3	2
	CD2	20	4	2
	CD3	20	3	2
	WDCLP 1	20	4	2
	WDCLP 2	20	4	2
	WDCLP 3	20	3	2
	Control 1	20	0	0
	Control 2	20	0	0
	Control 3	20	0	0
	<b>Total</b>	<b>180</b>	<b>21</b>	<b>12</b>
<b>JAIPUR MILK UNION</b>	CD 1	20	4	2
	CD 2	20	4	2
	CD 3	20	4	2
	WDP 1	20	4	2
	WDP 2	20	4	2
	WDP 3	20	4	2
	Control 1	20	0	0
	Control 2	20	0	0
	Control 3	20	0	0
	<b>- Total</b>	<b>180</b>	<b>24</b>	<b>12</b>
<b>Grand Total</b>	<b>360</b>	<b>45</b>	<b>24</b>	

**Table 2**  
**Single Factor of Knowledge About Milk Hygiene Techniques**

Knowledge About Producing Clean Milk	Factor 1 Knowledge of Milk Hygiene Techniques
1. Using strainer	0.65*
2. Covering the milk pot with its lid	0.59*
3. Refraining from milk adulteration	0.55*
4. Refraining from supplying colostrum milk	0.77*
5. Refraining from supplying a sick animal's milk	0.64*
6. Refraining from mixing stale milk and fresh milk	0.66*
7. Adopting other milk hygiene measures	0.46*
<b>Eigen value</b>	<b>3.09</b>
<b>Percent of Variance Explained</b>	<b>28.08</b>

**Table 3**

**Descriptive Statistics and Cronbach's Alpha of the Single Knowledge Factor**

Factor	Mean	Standard deviation	Cronbach's alpha
1. Knowledge of Milk Hygiene techniques	1.83	1.86	.74

**Table 4**  
Two-Factor Dimensions of Women Dairy Farmers' Disempowering Attitudes

Attitudes That Hinder Empowering Behaviors	Factor 1 Attitudes About Stifling Their Intrinsic Capabilities.	Factor 2 Attitudes About Being Grounded In Their Home.
1. Women should not speak in front of men	0.79*	0.18
2. Women should not decide about cattle feed purchases	0.76*	0.17
3. Women should not decide about breeding milch animals	0.72*	0.19
4. Women should not pour milk at the DCS	0.33	0.71*
5. Women should not work with men in the DCS	0.40	0.68*
6. Women should not work outside of their homes	0.45	0.77*
<b>Eigen Value</b>	4.36	2.1
<b>Percent of Variance Explained</b>	22.9	11.1
<b>Total Percent of Variance Explained = 34 percent</b>		

**Table 5**  
Descriptive Statistics and Cronbach's Alpha of the Two Disempowering Attitudinal Factors

Factor	Mean	Standard Deviation	Cronbach's alpha
1. Women's attitudes about stifling their intrinsic capabilities.	4.91	.94	.45
2. Women's attitudes about being grounded in their homes.	5.70	.63	.51

**Table 6**  
Factor Loadings of Variables Related to Women Dairy Farmers' Empowered Behavioural Practices

Empowering Behavioural Practices Carried Out by Women dairy Farmers	Factor 1 Behaviours to Initiate Social Change Activities	Factor 2 Behaviours to Launch Collective Activities	Factor 3 Behaviours to Communicate Assertively	Factor 4 Behaviours to Control Personal Finances and Time	Factor 5 Behaviours to Engage in Responsible Milk Sales Practices
1. Attendance at AGM of DCS	0.101	0.266	0.778*	0.077	0.019
2. Speaking at AGM of DCS	0.149	0.357	0.782*	0.017	0.061
3. Participation in the adult literary program	0.529*	0.098	0.023	0.148	0.054
4. Holding personal assets	0.096	0.112	0.054	0.863*	-0.069
5. Holding personal bank account	0.005	0.055	0.032	0.807*	0.169
6. Regular use of cattle feed	0.037	-0.026	0.0005	0.019	-0.113
7. Sending son to school	0.012	0.118	-0.028	0.025	0.108
8. Total control over spending milk income	0.190	-0.164	0.619	0.125	0.217
9. Partial control over spending milk income	0.033	-0.065	0.057	-0.029	-0.547
10. Sending daughter to school	0.016	-0.018	-0.030	0.006	-0.030
11. Consulting doctor for daughter's ill health	-0.016	-0.022	-0.001	0.009	0.016
12. Consulting doctor for son's ill health	-0.014	-0.027	-0.027	0.026	-0.030
13. Eating dinner with family members	0.150	0.056	0.231	-0.006	0.052
*14. Contesting election of DCS/local organizations	0.698*	0.009	0.167	0.102	0.055
15. Regular immunization of milch animals against foot and mouth disease	0.367	-0.022	0.002	-0.039	0.145

**Table 7**  
**Five-Factor Dimensions of Women Dairy Farmers' Empowered Behavioural Practices**

16. Adoption of family planning methods	0.172	-0.107	-0.030	-0.009	0.005
17. Feeding milch animals green fodder	0.018	-0.011	-0.003	-0.016	0.089
18. Immunization of children	-0.020	-0.005	0.212	-0.009	-0.118
19. Regular collection of milk payments	0.468	0.216	0.265	-0.052	<b>0.982*</b>
20. Equality in meeting nutritional needs of family members	0.052	0.056	0.040	0.001	-0.080
21. Cross-checking milk pass book entries with payments received	0.375	0.077	0.057	0.0001	<b>0.945*</b>
22. Not selling milk to private vendors	-0.037	0.050	0.185	-0.059	<b>0.673*</b>
23. Demanding remunerative prices for milk sold to DCS	<b>0.733*</b>	0.329	0.090	-0.063	-0.114
24. Demanding regular payments for milk sold to DCS	<b>0.636*</b>	0.179	0.272	-0.099	0.062
25. Selling milk regularly to DCS	0.118	0.356	0.328	-0.196	<b>0.937*</b>
26. Demanding sanitation of DCS milk collection center	<b>0.712*</b>	0.112	0.171	-0.078	0.100
27. Speaking to husband about DCS membership	0.173	<b>0.635</b>	<b>0.347*</b>	0.051	0.123
28. Taking milch animals to Travis regularly for artificial insemination	<b>0.624*</b>	0.043	-0.146	0.064	0.042
29. Starting individual or collaborated income generating ventures	0.161	<b>0.582*</b>	0.096	-0.088	-0.173
30. Membership in a women's group in the village	0.165	<b>0.682*</b>	0.134	0.175	0.301
31. Active participation in making decisions in the women's group	0.070	<b>0.865*</b>	-0.017	0.142	0.003
32. Distribution of workload among family members, including dairying	-0.176	0.181	0.020	<b>0.668*</b>	-0.223
33. Participation in protest movements against women's exploitation	0.109	0.857	0.086	0.111	-0.004
<b>Eigen Value</b>	5.701	2.581	1.959	1.853	1.429
<b>Percent of Variance Explained</b>	17.275	7.822	5.935	5.614	4.331
<b>Total Percent of Variance Explained = 54.6 Percent</b>					

Factor 1 Behaviours to Initiate Social Change Activities	Factor 2 Behaviours to Launch Collective Activities	Factor 3 Behaviours to Communicate Assertively	Factor 4 Behaviours to Personally Control Finances and Time	Factor 5 Behaviours to Engage in Responsible Milk Sales Practices
1. Participation in the adult literacy program	1. Membership in a women's group in the village	1. Speaking to husband about DCS membership	1. Holding personal bank account	1. Not selling milk to private vendors
2. Demanding remunerative prices for milk sold to DCS	2. Active participation in making decisions in the women's group	2. Attendance at AGM of DCS	2. Holding personal assets	2. Selling milk regularly to DCS
3. Demanding regular payments for milk sold to DCS	3. Starting individual or collaborated income generating ventures	3. Speaking at AGM of DCS	3. Distribution of workload among family members, including dairying	3. Regular collection of milk payments.
4. Demanding sanitation of DCS milk collection center	4. Contesting election of DCS/local organizations	4. Taking milch animals to Travis regularly for artificial insemination	4. Cross-checking milk pass book entries with payments received	

**Table 8**  
Descriptive Statistics and Cronbach's Alpha of  
the Five Behavioural Factors

Factor Deviation	Mean alpha	Standard	Cronbach's
1. Women's behaviors to initiate social change activities	6.7	4.3	.85
2. Women's behaviors to launch collective activities	6.2	4.5	.77
3. Women's behaviors to communicative assertively	6.9	6.4	.87
4. Women's behaviors to personally control finances and time	5.2	2.5	.67
5. Women's behaviors to engage in responsible milk sales practices	5.1	1.8	.52

**Table 9**  
Assessing the Differences Between Women Dairy Farmers  
of Intervention Versus Control Villages on the Various  
Dimensions of Empowerment in the Kolhapur Milk Union  
Using One-Way ANOVA

Dimensions of Empowerment	Differences Between CD and Control	Differences Between WDCLP and Control	Differences Between WDCLP and CD
<b>KNOWLEDGE SCALE</b>			
Knowledge of Milk Hygiene Techniques	Not Significant**	Not Significant	Not Significant
<b>ATTITUDINAL SCALES*</b>			
Women's attitudes about bolstering their intrinsic capabilities	Not Significant	Not Significant	Not Significant
Women's attitudes about being mobile outside of their homes	Not Significant	Not Significant	Not Significant
<b>BEHAVIORAL SCALES</b>			
Women's behaviors to initiate social change activities	Not Significant	Not Significant	Not Significant
Women's behaviors to launch collective activities	Not Significant	Significant	Significant (WDCLP is more effective)
Women's behaviors to communicative assertively	Significant	Significant	Not Significant
Women's behaviors to personally control finances and time	Not Significant	Significant	Not Significant
Women's behaviors to engage in responsible milk sales practices	Not Significant	Not Significant	Significant (CD is more effective)

\*In assessing attitudinal differences, the directionality of the attitude was reversed to make it consistent with the direction of the knowledge and behavioral scales.  
\*\* The level of significance was set at  $p < 0.5$

**Table 10**  
**Assessing the Differences Between Women Dairy Farmers**  
**of Intervention Versus Control Villages on the Various**  
**Dimensions of Empowerment in the Jaipur Milk Union**  
**Using One-Way ANOVA**

Dimensions of Empowerment	Differences Between CD and Control	Differences Between WDCLP and Control	Differences Between WDCLP and CD
<b>KNOWLEDGE SCALE</b>			
Knowledge of Milk Hygiene Techniques	Not Significant**	Not Significant	Not Significant
<b>ATTITUDINAL SCALES*</b>			
Women's attitudes about bolstering their intrinsic capabilities	Not Significant	Significant	Significant (WDP is more effective)
Women's attitudes about being mobile outside of their homes	Significant	Significant	Not Significant
<b>BEHAVIORAL SCALES</b>			
Women's behaviors to initiate social change activities	Not Significant	Significant	Significant (WDP is more effective)
Women's behaviors to launch collective activities	Not Significant	Significant	Significant (WDP is more effective)
Women's behaviors to communicate assertively	Significant	Significant	Significant (WDP is more effective)
Women's behaviors to personally control finances and time	Not Significant	Significant	Significant (WDP is more effective)
Women's behaviors to engage in responsible milk sales practices	Not Significant	Significant	Significant (WDP is more effective)

\*In assessing attitudinal differences, the directionality of the attitude was reversed to make it consistent with the direction of the knowledge and behavioral scales.

\*\* The level of significance was set at  $p < 0.5$

**ENDNOTES**

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2. Mr. Ganekar's MA education at Ohio University was funded in part by the present Ford Foundation grant and through partial tuition funds made available by Ohio University. Mr. Wayangankar's MA education was funded completely by the University of New Mexico.
3. In addition to survey interviews and in-depth interviews with women and men dairy farmers, focus-group interview data, archival data, and other participant observation data were also gathered (see Singhal, 1999a for detailed description of the various data-sets).
4. Additional findings in this realm, although not supported by Ford Foundation grant funds, are reported in Arun Wayangankar's (1994) MA thesis at the University of New Mexico and Shehner-Rogers, Rao, Rogers, & Wayangankar (1998).
5. While the CD Program was common to both the research sites, the WDCLP program and the WDP programs were specific to one of our two research sites. The WDCLP program was implemented in the Kolhapur region and the WDP program in the Jaipur region.
6. See Singhal (1999a) for a complete list of the knowledge, attitudinal, and behavioural items related to desired dairying practices as asked in the survey questionnaire.

7. Factor loadings of over 0.4 are considered significant and over 0.5 as highly significant \*Hair, Anderson, & Tatham, 1987).
8. A Cronbach alpha of over 0.70 or more usually indicates a highly reliable scale. A Cronbach alpha coefficient of 0.50 or higher is also considered acceptable.
9. By no means do we claim that the knowledge, attitudinal, or behavioral dimensions investigated in this study were exhaustive of all "empowering" dimensions, in all their various nuances, that women dairy farmers in India must contend with. These dimensions were identified, selected, and incorporated in the survey questionnaire in a highly participative process (see Singhal 1999 and 199a). However, this study is primarily an exploratory study in determining the various domains of empowerment, specific to the context of women dairy farmers in India.
10. Kolhapur District, located in Maharashtra State, seems to be quite "progressive" with respect to women's status as compared to several Indian states (for instance, the States of Uttar Pradesh and Rajasthan).
11. As with all research investigations, our research claims are partial, partisan, and by definition problematic. The present study, like most studies of this type, has several limitations. For instance, while our research design included a treatment-control group of women dairy farmers, we could still not overcome the problems of self-selection of respondents. For instance, the women who chose to participate in the WDP project in Rajasthan, one could argue, may have already been more "empowered" to begin with. Another problem lies in self-report data of survey respondents. Whether a women dairy farmer actually practices the behaviours that she says she has been empowered to practice, is not known. Further, our above-reported findings did not look at the role of caste, class, and other cultural factors that obviously influence women's empowerment.