Evaluating a Dairy Herd Improvement Project in Uruguay: Testing and Explaining Q Methodology

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Abstract

This paper has two purposes: 1) to describe and explain Q methodology and 2) to describe the evaluation of a dairy herd genetic registry project in Uruguay. The evaluation used Q methodology to focus on the social, economic, and contextual reasons why some producers in Uruguay had not participated in the registry. Centroid factor analysis with theoretical rotation reduced the 27 Q sorts into four distinct perspectives explaining lack of participation in the project. “Technicians” (cited lack of technical assistance available to some producers and sought a solution that focused on delivering the project through better trained technical advisors); “Activists” (cited structural issues as the barrier to participation with improved industry-wide efficiency as the solution); “Independents” (resonated with strong tones of personal and political reasons for the lack of participation); and “Economists” (reflective of the poor economic conditions facing many producers in Uruguay, namely depressed milk prices. However, despite the stark differences, the four perspectives also converged on a possible solution that recommended delivering the project through small, local, established organizations. Practical implications were 1) identifying and understanding why dairy producers abstained from participating was more complex than a simple explanation of a gap in knowledge about the program and 2) Q methodology functioned well in an agriculturally related evaluation context where tapping diverse and sometimes ignored perspectives is critical for program improvement.

Introduction and Setting

According to the International Dairy Federation, world milk production was forecasted to exceed 501 million tons in the year 2002 (IDF, 2002). In 2001, Uruguay produced 1.2 million tons of fresh milk with approximately 350,000 cows. Its northern neighbor, Brazil, was responsible for over 22 million tons of fresh milk from over 16 million head of cows in 2001. In light of this level of milk production, Uruguayan levels pale in comparison. The following paper describes an evaluation of a project designed to assist Uruguayan dairy producers in their efforts to remain competitive regionally and provide domestic foodstuffs.

In 1997, the Instituto Nacional Mejoramiento Lechero (INML) was formed in Uruguay to help improve the dairy industry. The INML closely resembles the Dairy Herd Improvement program (DHI) in the United States and translates from Spanish to “The National Dairy Herd Improvement Institute”. The INML is financed through user fees and the monetary contributions from seven agricultural agencies. This broad support suggests its importance and indicates the many sources of funding necessary to implement agricultural development projects in Uruguay. Central to its mission is the goal of assisting producers to produce more milk through better-informed production decisions, especially those based on data about expected progeny differences (EPD’s). In 1998, INML program planners began a project to improve the genetic base of the dairy industry in Uruguay through a genetic registry. The genetic registry entails recording individual-level production data from producers’ herds with the expectation that producers will use the data to make better decisions, specifically those related to culling unproductive cows.
**Purpose, Objectives, and Evaluation Questions**

In October of 2002, INML program planners consulted with the authors to request assistance in evaluating the genetic registry project. There was one specific programmatic issue that the evaluation was expected to shed light on and that was the issue of non-participation. In 2002, INML had approximately 200 dairy herds registered out of the roughly 6,000 dairy herds in Uruguay. Although INML had managed to attract the involvement of many large producers and a scattering of medium to small-sized dairy producers, more widespread participation, particularly from operations with less than 100 head, had eluded them. This situation made logical sense when viewed in light of two factors: cost and the price of milk. The user fees that partly support the registry are computed on the number of production units in the registry, thus making it more cost effective for larger producers than for smaller ones. Moreover, the price of milk in Uruguay was at its lowest point in years – approximately seven cents per liter (compared to roughly 32 cents per liter in the United States). However, despite these two barriers, INML program planners believed that the program could be beneficial to producers both large and small.

The authors, in collaboration with program planners, began a focused evaluation of the genetic registry project. However, in addition to providing evaluative information about the project, the authors also wished to test a novel approach to evaluation, termed Q methodology. The evaluation question therefore served as a way to learn about Q methodology in the context of evaluating an important agricultural project.

The evaluation focused on producers who had no knowledge of, or association with, the genetic registry project. Discussion with program planners developed the following evaluation question: **Why had some producers in Uruguay decided to forego participation in the genetic registry project?** More specifically, what economic and social forces existed to influence this decision?

Due to the complexity of economic and social forces, and how producers perceive and respond to them, the authors viewed Q methodology as an appropriate alternative to conventional research and evaluation methodologies because Q methodology functions well under these conditions. The authors hoped that the methodology would perform well in uncovering diverse, expected, and unexpected orientations toward the program. Moreover, the authors also hoped that the methodology could identify points of consensus and difference in non-participating producers’ perspectives that program planners could leverage to increase participation in the registry.

**Methodology**

Q Methodology has a rich, if little known, history. In 1934, British psychologist and physicist William Stephenson (a student of Charles Spearman) penned a letter to the editor of Nature magazine (Stephenson, 1935). In it, he wrote that he had re-conceptualized correlation analysis such that in place of correlating tests vis-à-vis random variables believed to be expressions of traits, he had developed, a method to correlate whole persons. What Stephenson described would grow into the scientific method Q Methodology.

Q Methodology (hereafter simply referred to as Q) involves the study of human subjectivity: the self-referential frame through which human beings define and express their world. Q is more than a technical data analysis tool. It is a way of approaching the study of human behavior with its own epistemology and ontology. Q has been used to explore phenomena in fields such as food and agricultural policy (Pelletier Kraak, McCullum, Uusitalo, & Rich, 1999), political science (Lipset, 1963), public policy (Focht, 2002) communication (Stephenson, 1967), public health (Dennis, 2001), psychology (Block, 1961), and evaluation (Garrard, & Hausman, 1985).

Central to Q is concourse theory (Stephenson, 1978). A Q concourse can be thought of as a population of statements, thoughts, visual depictions, or many other such human expressions. For example, in any given program, there are different opinions, perceptions, feelings, thoughts, and/or ideas about what it is like to be part of the program – or outside of it. These can be captured and recorded using either qualitative data gathering techniques (i.e. interviews), document review, or survey techniques. Once the Q concourse is captured and recorded, a Q sample is taken from it. The Q sample, like many samples, is not undertaken haphazardly. The structure of the
sample is best driven by theoretical concerns in order to provide a subset of the concourse in relation to the issue at hand. In evaluation terms, it makes good practice to structure the sample according to the evaluation questions or program theory.

The authors and INML program planners identified both program personnel and non-participants to interview as a main technique for establishing the concourse. It was our sense that the two groups would have different stories to tell about the genetic registry project. We wanted to understand why dairy producers were not participating in the project from the producer’s point of view. In the evaluation literature in general, non-participants are generally neglected as a source of data; something we wanted to remedy in this project.

We interviewed one dairy cooperative administrator, three technicians (two of whom were not connected to the project), and four dairy producers (all of whom who had not participated in the project). All interviews were transcribed in the speakers’ native language (Spanish) and coded according to emergent and theoretical themes.

The theoretical structure developed for use in this study consisted of two main dimensions (also referred to as “main effects”) with two “levels” within each of these, thereby resulting in the 2x2 matrix displayed in Table 1. The two main dimensions dealt with perspective (that of the farmer and that of the larger context) and pressures (economic pressures and social pressures); the cross-multiplying resulted in four cells that structured the Q sample.

Table 1

<table>
<thead>
<tr>
<th>Main Effects</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressures</td>
<td>Economic (a)</td>
</tr>
<tr>
<td>Perspectives</td>
<td>Farmer (c)</td>
</tr>
<tr>
<td>Total cells:</td>
<td>ac+ad+bc+bd = 4 cells</td>
</tr>
</tbody>
</table>

The coded data (i.e. statements) from the interviews were then divided according to the relative “fit” of each within one of the four cells. Although the Q researcher may choose to identify a particular statement with a specific cell or category, this a-priori “labeling” makes little difference to the subsequent interpretation of the data. No assumption is made that the statements themselves “measure” the identified categories or the theory or structure that undergirds the sample. What Q concerns itself with more directly is the use of theory, and not an attempt to prove it directly (Brown, 1993). The meaning we strive to find via Q does not reside in the statements; rather meaning is in the pattern of their Q sort. Stephenson was interested less in the statements themselves than in what people did with them (Stephenson, 1963).

The purpose of placing statements within a cell of the Fisherian structure is to provide a miniature of the population that mirrors the larger one in terms of its comprehensiveness, without sacrificing representation. In Q, statements are homogeneous with respect to their kind (they are related to the same thing) but heterogeneous concerning variance inherent in difference. In the Uruguayan Q sample, statements were alike with respect to the topic of non-participation yet diverse with respect to the specific mechanisms underlying the non-participation. Furthermore, the Fisherian design in Table 1 ensured representativeness.

It is also important that the Q sample was manageable in terms of size: it is difficult and time consuming for respondents to distinguish among more than 100 items (Brown, 1980). Q samples generally tend to number between 30 and 60, with the exact number being decided by the number of replicates in a given Fisherian theoretical structure. In the Uruguayan design, the authors sampled eight statements from each of the four cells in Table 1 (i.e. ac, ad, bc, bd), resulting in a Q sample of 32 statements.

The Q sample also needs to be balanced. Balance refers to the respondent having an equal opportunity to react positively and negatively to items in at least one of the main dimensions (such as perspective or pressure). Therefore, within one cell (such as that would be created from combining farmer and economic), four
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Statements were chosen that reflected a positive assertion while four statements were chosen that reflected disagreement with the positive assertion (Stephenson, 1953, p. 79). Caution must be employed to avoid selecting statements that are antonyms (e.g., “high” and “low”) for they serve little purpose in illuminating the more fine-grained discrimination reflective in most concourses.

Once the Q sample was drawn and statements numbered randomly, they were submitted to respondents for the Q sorting task. Respondents (called a p-set or person-set) were selected because they might have something to say in relation to the topic. Therefore, the p-set was purposeful. The producers were selected based on a 2x2 matrix with herd size (less than 100 head; more than 100 head) and participation (non-participants in any project; participants in other organizations/projects) serving as the main effects for structuring the sample.

Respondents were asked to place the statements, (written on individual cards), in an array that resembled a quasi-normal distribution. The distribution is oftentimes more platykurtic (i.e., “flatter”) than a normal distribution but retains the shape and properties of symmetry (see Figure 1).

\[
\begin{array}{cccccc}
-4 & -3 & -2 & -1 & 0 & +1 & +2 & +3 & +4 \\
\end{array}
\]

Figure 1. Q sort array for the 32-statement Uruguayan Q sample.

Respondents were directed to begin sorting the 32 statements into three piles: statements on the left reflective of those most unlike respondents; statements in the middle having no relevance for respondents; and finally, statements on the right reflecting those most like respondents. Once all of the statements were placed into their respective pile, respondents were instructed to select the two statements most uncharacteristic of their position and place them on the far left of the sorting surface. Once complete, respondents were then instructed to select the same number of statements that were most reflective of them and place them on the far right of the sorting surface. Respondents then proceeded to work alternately from opposite ends of the distribution, finally arriving in the middle – the location of least relevance. They were then asked to record the array on a sheet of paper.

It is at this stage that the evaluator analyzes the Q sorts, generally with the assistance of modern computing technology. The sorts are first correlated, and then submitted for factor analysis. Two methods of factor analysis are most widely marshaled for this task: centroid and principle components. Of the two, principle component analysis is the favored method of factor extraction. However, it has its limitations in Q methodology. There exists debate within the Q community over this issue despite Stephenson’s (1953) strong theoretical arguments in support of the centroid method.

To summarize briefly, the debate over the different methods of factor extraction have to do with their statistical properties. Centroid factor extraction uses an average correlation estimate (on average, the correlation between the sort under scrutiny and all others) to place on the diagonal of the inputted correlation matrix. This allows the researcher to pursue theoretical hunches for it does not require a determinant solution. Principal components analysis, on the other hand, uses a perfect inter-sort correlation estimate (1.0) to place on the diagonal of the inputted correlation matrix. This result is a clean factor analytic structure whereby factors are extracted in descending order according to the amount of variability that each explains. However, this ordering suggests that the factors so arranged is a somehow more “correct” solution to the data, thus discouraging any theoretical pursuits deemed interesting (Brown, 1980). The authors, informed by Stephenson, used the centroid method of factor extraction.

Factor analysis is of limited use without rotation. Rotation consists of changing the reference points of the geometric coordinate.
system to fit more closely the data and obtain “simple structure.” Simple structure refers to a situation in which individuals’ Q sorts are maximized on one factor with near-zero loadings on all others, thus enhancing interpretability of the results (McKeown & Thomas, 1988, p. 52). There are two methods most widely practiced by modern Q researchers: theoretical rotation and varimax rotation. Varimax rotation proceeds according to the mathematical criteria of minimizing the sum of the squared differences between the individual data points and the factor vectors. Theoretical rotation proceeds according to principles based upon expected phenomenological events and while it does not have the convenient statistical properties of varimax, what it lacks in this arena it more than makes up for through its flexibility. This flexibility is made possible through centroid factor extraction. In summary, the centroid method is most often used in conjunction with theoretical rotation and principle components analysis is most often augmented by varimax rotation.

Moreover, rotation in Q is undertaken in order to arrive at one factor solution at a time, such that sorts are purely loaded on one factor and near zero on others, thus focusing the lens through which we can view the factors and their relation to one another. This focusing, via rotation, does nothing to disturb the fundamental nature of the data; nor does it change the coordinates of any data point (i.e. Q-sort) in geometric space. What it does do, however, is to aid in the interpretation of factors at the other end. The authors used theoretical rotation in this study.

**Findings**

The 32 statement Q-sample was submitted to 27 individuals for sorting. Of these, 20 were producers who were not enrolled with the INML project or any other similar project; the other seven respondents were program personnel (e.g., planners, technicians). Of the 20 producers, nine had herds numbering over 100 head and 11 had herds numbering less than 100 head. The reason for choosing such a p-set was to compare non-participants’ perspectives in relation to those of program personnel.

First, it was necessary to “test” whether or not the data supported an inference that the two groups would differ in their Q sorts. This was done via factor analysis: if the program planners generally loaded on the same factor, we could then reason that their individual perspectives had common functional roots, different from other perspectives discovered in the study. Such a condition would allow us to pursue a rotational scheme that sought to maximize their sorts’ variability on the same factor and explore the ways in which this perspective converged and diverged from other perspectives in order to address non-participation.

In the analysis, it was determined that the inferred structure did indeed hold true for the p-set: the unrotated factor loadings indicated that five of the seven program personnel loaded on the same factor (called Factor A). A varimax solution was first sought for the data matrix. This is not unusual and oftentimes helps to lend insight into possible rotation solutions before any theoretical rotation begins. However, in this particular case, varimax rotation led to a decidedly unsatisfactory solution: although it accounted for 26 of the 27 sorts, it did so in nine different factors with no accompanying consensus or differentiating items. Theoretical rotation then proceeded according to the following principles, listed in order of importance:

1. Maintain as many of the seven program personnel as possible on the same factor.
2. Account for the greatest number of sorts in the fewest number of factors.
3. Eliminate any confounded (dual-loading) sorts.

The result was a four-factor solution, accounting for 17 of the original 27 sorts and 39% of the variability in the original 27x27 correlation matrix. Factor A contained nine significant sorts and explained 16% of the variability; Factor B held three sorts and 10% of the variability; Factor C had three sorts and eight percent of the variability; and finally, Factor D consisted of two sorts and explained five percent of the variability. None of the 27 sorts were confounded after rotation, although several had high loadings (but not statistically significant) on more than one factor.

A Q-analysis generally proceeds by way of factor interpretation; that is, those factors with significant Q-sorts associated with them are analyzed in terms of their item scores. Not only are the individual factors’ item scores analyzed, but the relative placement of items with respect to other factors is also analyzed. This method of
data presentation will become readily apparent in the following section. There are two driving principles in data presentation: 1) presentation and explanation of the factor item scores for each factor and 2) presentation of factor items scores that differentiate the particular factor from other factors.

**Factor A: The Technicians**

Factor A is characterized by a focus on the technical approach to programming. The factor rejects low milk prices or international policy as explanations for the lack of producer participation. Five of the seven program personnel loaded on this factor and were joined by four producers. Furthermore, it is a producer whose sort is most highly correlated with the factor. The Technicians view technology (and its attendant experts) as the answer to participation woes, as well as to depressed economic conditions. Factor A is defined by the following two ideas: 1) program participation can be enhanced if the program would focus on working through technicians and 2) producers would be more likely to participate if they were provided the technical training and assistance. The technical focus is illustrated by the following items (with item scores in parentheses for Factors A through D respectively; Factor A’s scores are in italics):

1. (+4 0 -4 -4) The way to get more producers to participate in the project is through the technicians that provide assistance.
2. (+3 0 +1 0) In order for producers to utilize the system, the project needs to provide them with technical assistance.
3. (+3 -2 -4 -3) I want to use the system of the Milk Improvement Project, but I need help to keep data and enter it in the computer.

With the exception of Factor C in the second item, there is little agreement with Factor A’s perspective among the other three. Indeed, with respect to the first item, both Factors C and D reject the item as strongly as the Technicians embrace it – they are polar opposites with respect to increasing participation in the project by way of the technician as a medium to do so. Additionally, the third item highlights Factor A’s fixation on the assistance part to the equation; Technicians believe that producers need physical help to deal with the technology.

The following pricing and policy items deepen the Technicians perspective (item scores arranged as before). Note that the Technicians reject rather than affirm these statements:

1. (-4 +2 +3 0) Milk prices are low because the international markets and the policies of the bigger countries keep them low.
2. (-4 +4 +2 +4) If we could modify the international markets, milk prices would be more favorable to us.

Factor A factor not only endorses technology as a solution to participation and economic woes, but it couples this endorsement with a rejection of price as a barrier to economic prosperity. Factor A is in agreement with prototypical diffusion-adoption model of technology transfer (Rogers & Burdge, 1972). In other words, in order to solve real-world problems, agencies are thought to need to implement technical solutions via experts, preferably via one-on-one contact with producers.

**Factor B: The Activists**

Factor B is demarcated by its endorsement of activism towards the international markets and the industry as a whole. According to the Activists, the way to increase participation is to make the system more efficient from markets to the entire supply chain. Although the Activists do not reject technology, it is not foremost on their radar screen. Items that clarify the Activists’ perspective are:

1. (+1 +4 -1 -1) If we want the producers to participate, we have to help them to become more efficient as in other parts of the world.
2. (-4 +4 +2 +4) If we could modify the international markets, milk prices would be more favorable to us.
3. (-2 +3 -1 0) The only way for producers to participate more in the project is through the improvement of the entire technological process of the industry chain, so that the producers can become more competitive.

Although there is some agreement between the Activists and Factor D with respect to international markets, it is in what the Activists reject that further illuminates their perspective:

1. (+1 -4 0 0) If I had more time I would participate in the project, but the problem is that it takes time to sit down and enter data in the computer.
(0 -4 0 -1) Producers simply do not want to use the record system - that is why they do not participate.
(-2 -3 0 +2) I already belong to a dairy organization and it is difficult for me to be part of several different ones.

The Activists strongly reject the idea that lack of participation (or its appropriate solution) has anything to do with time, motivation, or competing organizational interests. This also squares with the tone of the items scored +4: both extremes resonate with a sense of resolve, action, and motivation to address structural issues affecting the individual dairy producer.

Factor C: The Independents

Factor C, the Independents, is a bi-polar factor with two sorts on the positive pole and one sort on the negative pole and is populated by producers who had more than 100 head of cows. The positive pole was more strongly defined. The two sorts were correlated with the factor at .66 and .75 respectively, while the sort negatively correlated with the factor was -.54. The authors therefore offer a tentative explanation of the factor, although one that is supported by the differentiating items.

The Independents is a perspective characterized by items that carry tones of independence while rejecting technical solutions to non-participation. However, interwoven through the factor is a cynicism that the project is not particularly equipped to address the overwhelming issue of price. This cynicism is buttressed by the notable absence of “solution” items at the positive end of the continuum and a rejection of other “solution” items at the other end of the continuum. Items that characterize Factor C are:

(+1 +1 +4 -4) The milk prices are too low, but we cannot turn that around - we have to accept the current situation and see what we can do. It is not because of low milk prices that I have not participated.
(-1 +1 +4 +2) I do not like to be pressured to participate. It is my decision and no one else’s.
(-3 -1 +3 -3) I do not see what the project can do to help increase low milk prices.

In addition, at the other end of the continuum, notice the rejection of solution items:

(+4 0 -4 -4) The way to get more producers to participate in the project is through the technicians that provide assistance.
(+2 +3 -3 +2) Producers would get participate in the project if it showed that by using the record and management system, they would improve their efficiency.
(+2 0 -3 +3) More producers would be using the record system if they were trained to collect and enter data in the computer.

Unlike the Technicians or the Activists, the Independents reject structural or political remedies to non-participation. One is left wondering what would be required to increase the participation from this group. There is some evidence that participation from this group will not occur partly because economic pressures are not a driving consideration for participation thus:

(-2 +1 -3 +1) If the price of milk were higher, I would participate in the milk improvement project.

Some explanation of what is motivating the Independents to forego participation can be garnered from statements that speak to other organizations’ efforts in the same general arena, particularly when viewed in context with the statement above on being pressured to participate. It is true that statements of this kind are not salient to Independents; but the statements nevertheless provide a tentative explanation for the complexity of a perspective that is strongly autonomous and unconcerned with price as a mechanism prohibiting their participation. Independents offer some degree of solution to non-participation by means of working with other local organizations; however, there is no accusatory tone as in Factor B. Instead, here is evidence they wish to continue working with their local organization, regardless of the tack the project employs to increase participation:

(+4 +2 +2 +3) If we want producers to participate, the project must work with other organizations that are actually currently providing services to the producers.
(-1 -2 +2 0) I am loyal to my organization that I work with; it provides all of the services I need.

Factor D: The Economists

Factor D was the most difficult factor to interpret. There are paradoxes within the factor array: at one end, price seems to be the reason...
for non-participation while at the other end of the array, price as an explanation for lack of involvement seems to be rejected. It appears from the factor array that the Economists have a fixation on price as the motivating force behind their personal lack of involvement. However, despite the fact that price appears to be a force prohibiting broader involvement, the solution offered to increase participation has more to do with social forces, such as working with other organizations and training producers.

(-1 0 +3 +4) I do not see what the project can do to change the policies that determine the low prices of milk.

(-4 +4 +2 +4) If we could modify the international markets, milk prices would be more favorable to us.

(-3 -3 -2 +3) I do not believe milk prices are likely to increase, so I do not think I will participate to keep records.

Unlike the Technicians, Activists, or Independents, the Economists reject the following item because it is low prices that have barred their greater involvement with the project:

(+1 +1 +4 -4) The milk prices are too low, but we cannot turn that around - we have to accept the current situation and see what we can do. It is not because of low milk prices that I have not participated.

There is nonetheless a sense of harmony within the perspective and it is about price. Price is a formidable barrier to Economists’ participation; one has only to view the item scored +3 above to get a sense that this group will not participate because prices are not likely to increase. Moreover, the item is unambiguous in its explication of a cause-and-effect relationship: low prices (the cause) drive non-participation (the effect). A summary of the four perspectives is presented in Table 2.

Table 2.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Reason for non-participation</th>
<th>Possible solution</th>
<th>Leverage points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technicians</td>
<td>Lack of technical assistance</td>
<td>Train technicians – deliver program through them</td>
<td>Focus on a service mentality</td>
</tr>
<tr>
<td>Activists</td>
<td>Nothing to do with lack of time or motivation; it is structural</td>
<td>Improve efficiency of the entire industry/supply chain</td>
<td>Focus on making the argument that the project is aimed at increased efficiency</td>
</tr>
<tr>
<td>Independents</td>
<td>Personal and to some extent, political/social</td>
<td>Focus on working with local organizations</td>
<td>Give them space to disagree – but look for ties to local organizations</td>
</tr>
<tr>
<td>Economists</td>
<td>Low price of milk</td>
<td>To a degree, deal with prices but also technology</td>
<td>Unclear at this point</td>
</tr>
</tbody>
</table>

Discussion and Implications
The strength in using Q is that oftentimes, consensus items emerge from a study. One of the most striking discoveries was a possible way in which to increase participation: via the local existing organizations, as seen in the following statement:

(+4 +2 +2 +3) If we want producers to participate, the project must work with other organizations that are actually currently providing services to the producers.

This finding was affirming: program planners at INML had already begun this process as of the 2002 calendar year. They had switched tactics in 2002 and had begun presenting program information through small, local organizations of roughly 10 or so producers. Program planners’ experiences, as well as the data, confirm that this was a wise programming decision and should continue. The second reason concerns policy. In Uruguay as in more developed countries, several organizations operate on the local level, charge a fee, and are active in policy discussion. This makes these organizations political in nature and competitive with respect to membership. Many of these local organizations perform technical service similar to that of INML – but none so broadly or with so many registrants. INML is therefore challenged to work with oftentimes-politicized local
organizations to attract members into a strictly technical venture. Each of the four perspectives, however, sees the potential benefit from working with these organizations, despite current challenges.

Local organizations, then, become strategic advantage points for program intervention. Although there is no way for the current study to infer what percentage of non-participants are associated with each perspective, what is critical is that all of the perspectives agree that working with the local organizations is a desirable way in which to increase participation in the genetic registry project.

The current study also holds numerous implications for extension education. One theoretical implication has to do with a conception of needs. What is oftentimes perceived to be a straightforward process of needs identification is more complex than a simple knowledge gap. People have educational needs but these do not always motivate people to participate in meaningful and worthwhile educational interventions. People’s needs are situated within a human value system that envelopes such concepts as need, interests, and motivation, concepts not readily amenable to contemporary forms of needs identification and assessment, which brings us to the methodological implication.

Because the concept of educational need is one that is situated within a larger system of human values and interest (what the article refers to as “perspective”), our methodological choice in tapping these perspectives must be adept at rising to the challenge. Forms of inquiry must take into account not our definition of terms and things – but must allow participants to saturate these very terms and things with their individual, very human, meaning. Such an approach calls for privileging participants’ voices over our own and must work from a frame grounded in the program to be sure that the inquiry is grounded in the language of the program itself. All of these characteristics so describe Q. The authors hope that the reader is left at this point intrigued that the methodology holds merit for investigations into human subjectivity within the field of agricultural extension and education.

There are also implications of the research with respect to Q methodology. Three main points come to mind. The authors were also pleased at how receptive program personnel were to Q methodology. Although they had not heard of Q, they were open to its potential to highlight the complexities of the issues. This was unexpected not because the program planners in this study appeared rigid; rather because it is not uncommon for Q researchers to meet methodological inflexibility on the part of those first introduced to Q. Secondly, a hands-on training using Q at the beginning of the research endeavor proved useful in introducing program personnel to the intricacies of the methodology. It is our suspicion that this training reaped dividends because program personnel became excited about the prospect of trying something new. Finally, it is important for researchers and practitioners interested in using Q to realize that there is a learning curve in undertaking such an endeavor. Because Q borrows from two distinct traditions, forging these into a distinct approach to inquiry is at times daunting.

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