Understanding Factors Influencing Farmers' Intention for Adopting Improved Grassland Using the Theory of Reasoned Action, in the Highlands of Central Mexico

Carlos Galdino Martínez-García
Universidad Autónoma del Estado de México, Mexico

Carloss Manuel Arriaga-Jordan
Universidad Autónoma del Estado de México, Mexico

Adolfo Armando Rayas-Amor
Universidad Autónoma del Estado de México, Mexico

Peter Dorward
University of Reading, UK

Tahir Rehman
University of Reading, UK

Understanding factors influencing farmers' intention for adopting improved grassland using the Theory of Reasoned Action, in the highlands of Central Mexico

Carlos Galdino Martínez-García[1*], Carlos Maneul Arriaga Jordan[1], Adolfo Armando Rayas-Amor[1], Peter Dorward[2], Tahir Rehman[2]

[1*]Instituto de Ciencias Agropecuarias y Rurales- UAEMex, Toluca, México
[2]University of Reading, Reading, United Kingdom
[*]Corresponding author e-mail : cagmg17@yahoo.com.mx

Keywords: Dairy, Farmer, Grassland, Reasoned action

Introduction

Low adoption of improved grassland among small-scale dairy farmers has been attributed to different factors such as farmers and household characteristics, farm characteristics, institutional characteristics and capital constraints (Martínez-García *et al.*, 2012). Several researchers illustrate the importance of farmers' attitude, beliefs and social pressure from the salient referents in the adoption of innovations (Rehman *et al.,* 2007; Rossi Borges *et al.*, 2014). Regarding Mexico, there is a lack of information about understanding of attitudes, beliefs and social pressure underpinning farmers' intentions to adopt agricultural innovations. In contrast to many adoption studies, it focuses on an innovation that has been successfully adopted. Therefore, the objective of this research was to understand factor influencing farmers' intention for adopting improved grassland on their farms.

Materials and Methods

Data collection: In order to feed the psychological model of the Theory of Reasoned Action (TRA), the data collection was conducted in two distinct phases, as recommended by Ajzen and Fishbein (1980). In the first phase, semi-structured individual interviews with 15 farmers, elicited 11 salient outcome beliefs statements (increases fodder production, provides fodder of good nutritive quality, provides fodder availability throughout the year, decreases animal feeding expenses, cheap way to feed the herd, increases milk production, grassland is easy to manage, demands high financial investments, investments are not recovered from milk sales, requires availability of land, requires land of good nutritive quality) and 10 salient referents (self-initiative, self-observation, father, other experienced farmers, bother, uncle, university, government, veterinarian and grandfather). In the second phase a structured questionnaire was conducted with 80 farmers (from the municipality of *Aculco*, State of Mexico, Mexico), which included the 11 beliefs and the 10 salient referents. The questionnaire also asked for information about socioeconomic and farm characteristics.

Data analysis: The sample was divided in established users (n=64) and recent users (n=16). To identify differences between groups, a set of eleven quantitative variables (five socioeconomic variables: farmer's age, farmer's education, farmer's experience, family members, farming work members and six farm variables: herd size, number of cows in production, total milk yield per herd per year, total number of hectares, area (ha) used for grassland, and years using improved grassland) were analysed through an independent sample *t*-test. The TRA components were analysed in disaggregated form. According to nature of TRA data, non-parametric tests were adopted; thus, Spearman Rank Order correlation was conducted. The Mann-Whitney *U* test was used to assess the significant differences between established and recent users. The data were analysed with SPSS 22.

Results and Discussion

Management of the improved grassland: Farmer utilise an annual variety of Westerwold ryegrass combined with white clover and due to the management they normally maintain the grassland over 10 years before replanting it. To conserve the grassland for long time and for forage, farmers leave several tufts of grass distributed in the whole plot until these mature to drop the seeds on the land, in this way the grassland is replanting itself naturally. Farmers cut and carry the grassland by section every day; this allows them to apply manure on the grassland after each cutting. It was observed that the manure has clover seeds; it allows the clover to be replanted also naturally. Farmers wait for 25 to 30 days before cutting the section of grassland again where they put the manure. Farmers have access to local low cost gravity fed irrigation systems from a dam (dam of *Ñadó)*, allowing them to irrigate the grassland once a month (for 48 hours) during the dry season (November to April). Farmers reported that the irrigation and application of manure are key management

practices to keep the grassland alive. This kind of management has allowed using the innovation over 22 years in the community; thus, the knowledge has been transmitted from father to son.

General features of established and recent users: The two groups had similar socioeconomic and farm characteristics, since the results of the independent *t*-test showed that out of the five socioeconomic variables analysed, only the farmer's education showed statistical differences ($p<0.05$) between established and recent users; whereas out of the six farm variables analysed, only the years of using improved grassland on farm showed statistical differences ($p<0.01$) between the two groups.

Beliefs underpinning attitude of established and recent users: There were significant differences in four out of eleven evaluative beliefs between the two groups. Established users showed higher score (median=1.50) than recent users (median=1.06) about the importance of knowledge of grassland management ($U=279.50$ $p<0.001$). This could be attributed to the higher experience of the established users. In contrast, three negative beliefs about using improved grassland on farm: demands high financial investment (established user median=0.83, recent user median=0.06, $U=332.50$ $p<0.001$), investments are not recovered with the milk sales (established user median=1.28, recent user median=0.56, $U=318.00$ $p<0.001$) and availability of land (established user median=1.39, recent user median=0.50, $U=303.00$ $p<0.001$) were significantly more negatively evaluated by recent users than established users.

Cognitive barriers and drivers for the established and recent users: One cognitive barrier for using improved grassland on farm is evident for the two groups: investments are not recovered from milk sales. This implies that farmers in both groups who feel that investments for using improved grassland on farm are not recovered from milk sales are less likely to express an intention to use the innovation in the farms. On the other hand, six cognitive drivers or promoters for using improved grassland are evident for the established and resent users: decreases animal feeding expenses increases fodder production, increases milk production, provides a cheap way of herd feeding and provides fodder of good nutritive quality and ensures fodder availability throughout of the year. This suggests that farmers' decisions were based on their general feelings about the pros and cons of the use of the technology on their farms.

Subjective norms toward using improved grassland by established and recent users: The comparison of the overall median scores shows that established users are more motivated to comply than recent users by the salient referents (established user median=5.69, recent user median=2.25, $U=325.50$ $p<0.05$), mainly by their fathers (established user median=0.98, recent user median=-0.06, $U=302.00$ $p<0.01$) and their uncles (established user median=0.27, recent user median=-0.69, $U=253.50$ $p<0.01$). Extension programmes could be target these salient referents as channels and sources for developing appropriated communication strategies for promoting the use of improved grassland, especially among farmers who have not already been engaging in the use of this technology.

Conclusion

The results showed the management implemented by farmers on the grassland played an important factor for adopting the innovation. It is also recognised that the factors influencing farmers' intention for adopting improved grassland were strongly associated with the farmer's beliefs and social pressure from salient referents. Therefore, the drivers and social referents identified in the research should be considered as channels and sources of knowledge and communication by the extension services in order to promote improved grassland, especially among farmers who have not already engaged in the use of the innovation.

References

Ajzen, I and M. Fishbein. 1980. *Understanding attitudes and predicting social behaviour.* Prentice-Hall, Upper Saddle River, NJ.

Martínez-García, C. G., P. Dorward and T. Rehman. 2012. Farm and socioeconomic characteristics of small-holder milk producers and their influence on the technology adoption in Central Mexico. *Tropical Animal Health and Produntion* 44: 1119-1211.

Rehman, T., K. McKemey, C. M. Yates, R. J. Cooke, C. J. Garforth, R. B. Tranter, J. R. Park, and P. Dorward. 2007. Identifying and understanding factors influencing the uptake of new technologies on dairy farms in SW England using the theory of reasoned action. *Agricultural Systems* 94: 281-293.

Rossi Borges, J.A., A. G. J. M. Oude Lansink, C. Marques Ribeiro and V. Lutke. 2014. Understanding farmers' intention to adopt improved natural grassland using the theory of planned behaviour. Livestock Science 169: 163-174.