

# Socio-economic factors affecting the level of adoption of innovations in dairy cattle enterprises\*

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**Summary:** This research was conducted to determine the socio-economic factors which are effective in helping dairy cattle enterprises to adopt some innovations in Afyonkarahisar. The data acquired from questionnaires of 80 randomly selected enterprises were analyzed with chi-square test in May 2006. Enterprises those have 1-10, 11-35 and more than 35 cattle were classified as small, medium and high scale, respectively. It was found that 12% of enterprises adopt innovations at low level, 65% of them at medium level and 23% of them at high level. Consequently, a parallel relationship was determined between adopting innovations and the scale of the enterprises ( $p<0.01$ ), education level and age of the producer ( $p<0.05$ ), his work experience ( $p<0.05$ ), his standard of living ( $p<0.05$ ), his participation in social life, his level of being open to outer cultures, his ability of empathy and his level of using mass media tools ( $p<0.01$ ), but no relationship was seen between main occupation of the producer, type of his family and the milk production level of the enterprises ( $p>0.05$ ).

Key words: Chi-square ( $\chi^2$ ), empathy ability, standard of living, technological development

## Süt sığırıcılığı işletmelerinde yeniliklerin benimsenme düzeyine etkili sosyo-ekonomik faktörler

**Özet:** Bu araştırma, Afyonkarahisar'da süt sığırıcılığı faaliyetinde bulunan işletmelerin bazı yenilikleri benimseyip uygulamasında etkili olan sosyo-ekonomik faktörleri belirlemek amacıyla yapılmıştır. Mayıs 2006'da tabakalı rastgele örnekleme yöntemiyle seçilen 80 adet işletmeden anket yoluyla elde edilen verilere ki-kare testi uygulanmıştır. Araştırmada, 1-10 baş hayvana sahip işletmeler küçük, 11-35 baş hayvana sahip olanlar orta ve 36 ve üzeri hayvana sahip olanlar da büyük ölçekli olarak değerlendirilmiştir. İncelenen işletmelerin yaklaşık %12'si düşük, %65'i orta ve %23'ü de yüksek düzeyde yenilikleri benimser olarak bulunmuştur. Sonuç olarak işletme büyüklüğü ( $p<0.01$ ), üreticinin eğitimi ve yaşı ( $p<0.05$ ), deneyimi ( $p<0.05$ ), yaşam standardı ( $p<0.05$ ), sosyal katılım ve dış kültüre açılım düzeyleri, empati yeteneği ve kitle iletişim araçlarından faydalanma durumu ( $p<0.01$ ) ile yeniliklerin benimsenmesi arasında anlamlı; üreticinin esas mesleği, aile şekli ve işletmenin süt verim düzeyi ( $p>0.05$ ) arasında anlamsız bir ilişki tespit edilmiştir.

Anahtar sözcükler: Empati yeteneği, ki-kare ( $\chi^2$ ), teknolojik gelişme, yaşam standardı.

## Introduction

Efforts of modernization in livestock sector starts with technologic improvement of the rural areas. Therefore producers of this sector must be oriented to use new technologies and adopt innovations in order to improve the economy (3, 12).

The level of adopting innovations depends on the structure of the society, the standard of life and economic contribution of those innovations. If the innovation has an economic contribution, the speed of its distribution increases (14). Communication facilities also positively affect the spread of the innovations (15). In order to evaluate this process of improvement more efficiently,

the consequences on the individuals in rural areas and the importance of the socio-economic factors which seem to be effective on adopting and practicing (education, age, work experience, main occupation, participation in social life, opening outer cultures, scale of enterprise and production level) must be analyzed deeply (1, 4, 9, 11).

This research was carried out to determine the level of the adoption of innovations regarding milk production by dairy cattle enterprises in Afyonkarahisar Province.

## Materials and Methods

The material of this research was acquired from 80 dairy cattle enterprises bound to "Holstein-Friesian

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Association” in Afyonkarahisar Province. A questionnaire was made with these randomly selected (7) 80 enterprises in May 2006.

Enterprises scale and the level of milk production (kg/day/cow) were analyzed regarding the structure of the enterprise. Enterprises those have 1-10, 11-35 and more than 35 cattle were classified as small, medium and high scale, respectively. The level of production was considered as low (0-8 kg), medium (9-17 kg) and high ( $18 \geq$  kg) (average level of production: 8.21 kg/day/cow) according to the records of the Agriculture Directorate of the Province (8).

Animal insurance, pure breeding, modern housing system, concentrated feed, silage, milking machine, automatic water dispensers, ear tagging usage and artificial insemination parameters were considered to determine the level of adopting innovations of producers. For each of the innovations, enterprises were questioned about the time and the source they learn the innovations, the duration between learning and practicing the innovations and the situation on sustaining the innovations. The answers were evaluated by scoring and the enterprises were classified as low (1-16), medium (17-24) and high (25 and more) level according to adoption of innovations (14).

Later on, the level of adopting innovations were determined according to enterprise scale, milk production, the producer’s education level, age, experience, family type, standard of living, position of participation to social life, connection with outer cultures, ability of empathy and usage of mass media tools. Then the relationships between them were analyzed (10, 12).

In order to determine the standard of living, information about the producer's house, electronic devices, furniture and cleaning materials were analyzed and classification was done according to these results as low (1-10 point), medium (11-16 point) and high (17 and more point). Likewise, the ability of empathy was determined by the answers and classified as low (0-3 point), medium (4-6 point) and high (7 and more point) level (12). Chi-square test was used to analyze the data (7).

## Results

At the end of the research, it was determined that approximately 12% of the enterprises adopt innovations at a low level while 65% of them at medium level and 23% of them at a high level. It was also found out that there was a parallel relationship between the level of adopting innovations and enterprise scale ( $p < 0.01$ ), while it has no connection with the level of production ( $p > 0.05$ ), (Table 1 and 2).

Table 1. Adoption level of innovations according to enterprise scale

Tablo 1. İşletme ölçeğine göre yeniliklerin benimsenme düzeyleri

Enterprise scale	Low level		Medium and High level		Total	
	N	%	N	%	N	%
Small	5	45.5	6	54.5	11	100.0
Medium and Large	5	7.2	64	92.8	69	100.0

$\chi^2 = 9.250$   $p < 0.01$

Table 2. Adoption of innovations levels according to milk production in enterprise

Tablo 2. İşletmelerde süt verimine göre yeniliklerin benimsenme düzeyleri

Milk production	Low level		Medium level		High level		Total	
	N	%	N	%	N	%	N	%
Low and Medium	7	15.9	29	65.9	8	18.2	44	100.0
High	3	8.3	23	63.9	10	27.8	36	100.0

$\chi^2 = 1.732$   $p > 0.05$

It was understood that producer's education level and age were important factors in adopting innovations ( $p < 0.05$ ) (Table 3 and 4).

Table 3. Adoption level of innovations with regard to the education of the owner of the enterprise

Tablo 3. İşletme sahibinin eğitimi ile yeniliklerin benimsenme düzeyleri

Education	Low level		Medium level		High level		Total	
	N	%	N	%	N	%	N	%
Primary school	8	17.4	33	71.7	5	10.9	46	100.0
Middle and High school	2	5.9	19	55.9	13	38.2	34	100.0

\* $\chi^2 = 9.335$   $p < 0.05$

Table 4. Adoption level of innovations with regard to the age of the owner of the enterprise

Tablo 4. İşletme sahibinin yaşı ile yeniliklerin benimsenme düzeyleri

Age groups	Low level		Medium and High level		Total	
	N	%	N	%	N	%
Young (18-35) and Middle (36-50)	4	6.7	56	93.3	60	100.0
Old ( $51 \geq$ )	6	30.0	14	70.0	20	100.0

\* $\chi^2 = 6.457$   $p < 0.05$

No relationship was observed between the level of adopting innovations and the main occupation of the producer ( $p > 0.05$ ) but significant relationship was determined between the level of adopting innovations and his work experience ( $p < 0.05$ ), (Table 5 and 6).

Table 5. Adoption level of innovations with regard to the work experience of the owner of the enterprise  
Tablo 5. İşletme sahibinin mesleki deneyimi ile yeniliklerin benimsenme düzeyleri

Work experience	Low and Medium level		High level		Total	
	N	%	N	%	N	%
1-5 years	5	50.0	5	50.0	10	100.0
6 ≥ years	57	81.4	13	18.6	70	100.0

$\chi^2= 4.250 p<0.05$

Table 6. Adoption level of innovations with regard to the main occupation of the owner of the enterprise  
Tablo 6. İşletme sahibinin esas mesleği ile yeniliklerin benimsenme düzeyleri

Main occupation	Low and Medium level		High level		Total	
	N	%	N	%	N	%
Mixed	54	78.3	15	21.7	69	100.0
Others	8	72.7	3	27.3	11	100.0

$\chi^2= 0.160 p>0.05$

No relationship was observed between the type of family and level of adopting innovations ( $p>0.05$ ) (Table 7).

Table 7. Adoption level of innovations according to family type of the owner of the enterprise  
Tablo 7. İşletme sahibinin aile tipine göre yeniliklerin benimsenme düzeyleri

Family type	Low level		Medium level		High level		Total	
	N	%	N	%	N	%	N	%
	Nuclear family	7	13.0	36	66.7	11	20.3	54
Patriarchal family	3	11.5	16	61.5	7	27.0	26	100.0

$\chi^2= 0.434 p>0.05$

It was determined that the standard of living had an important role on adoption of the innovations by the enterprises ( $p<0.05$ ) (Table 8).

Table 8. Adoption level of innovations according to standard of living of the owner of the enterprise  
Tablo 8. İşletme sahibinin yaşam standardına göre yeniliklerin benimsenme düzeyleri

Standard of living	Low and Medium level		High level		Total	
	N	%	N	%	N	%
Low	32	91.4	3	8.6	35	100.0
Medium and High	30	66.7	15	33.3	45	100.0

$\chi^2= 5.575 p<0.05$

A parallel relationship was observed between level of the enterprise's adopting innovations and social participation, opening to outer cultures, level using of mass media tools and ability of empathy ( $p<0.01$ ) (Table 9 - 12).

Table 9. The effect of the social participation of owner of enterprise on adoption level of innovations  
Tablo 9. İşletme sahibinin sosyal katılımının yenilikleri benimsenme düzeyine etkisi

Association membership	Low and Medium level		High level		Total	
	N	%	N	%	N	%
1 membership	59	85.5	10	14.5	69	100.0
2 membership	3	27.3	8	72.7	11	100.0

$\chi^2= 15.310 p<0.01$

Table 10. The effect of being opening outer culture by the owner of enterprise on adoption level of innovations  
Tablo 10. İşletme sahibinin dış kültüre açılmasının yenilikleri benimsenme düzeyine etkisi

Opening outer culture	Low and Medium level		High level		Total	
	N	%	N	%	N	%
Low	41	91.1	4	8.9	45	100.0
Medium and High	21	60.0	14	40.0	35	100.0

$\chi^2= 9.217 p<0.01$

Table 11. The effect of using mass media tools by the owner of enterprise on adoption level of innovations  
Tablo 11. İşletme sahibinin kitle iletişim araçlarını kullanımının yenilikleri benimsenme düzeyine etkisi

Mass media tools	Low and Medium level		High level		Total	
	N	%	N	%	N	%
Newspaper, tv, radio	57	83.8	11	16.2	68	100.0
Professional publication	5	41.7	7	58.3	12	100.0

$\chi^2= 8.814 p<0.01$

Table 12. The effect of empathy ability of the owner of the enterprise on adoption level of innovations  
Tablo 12. İşletme sahibinin empati yeteneğinin yenilikleri benimsenme düzeyine etkisi

Empathy ability	Low level		Medium and High level		Total	
	N	%	N	%	N	%
Low	8	47.1	9	52.9	17	100.0
Medium and High	2	3.2	61	96.8	63	100.0

$\chi^2= 19.039 p<0.01$

## Discussion and Conclusion

The proportion of groups formed by enterprises' level of adopting innovations differed from the ones in Aydın (14) and Amasya Provinces (12) in this study. The level of low scale enterprises was notified as 19% and 28%, medium scale enterprises level as 54% and 51%, the level of high scale enterprise innovations as 27% and 21%. The difference between those scales could be due to the different geographies and cultures.

Since 93% of medium and high scale enterprises were composed of medium and high level innovations, this confirmed the difference in relationship between enterprise scales and adopting innovations. The fact that, the level of adopting innovations increases when the enterprise scale increases, has been stated in other researches, too (6). Contrary to some researches (14), it was found that the level of milk production doesn't play an important role in adopting innovations.

The education level of a community is the most important indicator of social change. For this reason, it is known that education level is effective in adopting and practicing the innovations in rural areas (15). It was statistically found out that the increase in education level affects innovations in Afyonkarahisar as well. While the positive influence of the educational level on adopting innovations was reported in several studies (9, 10, 11), in some other works it is said that it has no role in adopting innovations (1, 4).

On the other hand, the age of the producer is one of the factors which affect the decisions and actions made in the enterprises, because people's thoughts, behaviors and needs are primarily related to their ages (12). The age factor was also found to affect innovations. In some researches it was stated that age affected innovations (4), while in some others not (9, 11).

The main occupation of the producers and their work experience are of great importance in terms of economic improvement and specialization in production (10). The results of this research showed that the experience of the producer affected the adoption of innovations while the main occupation of the producer not. It was thought that the results of this study was affected by two main factors, one was the fact that approximately 87% of the producers were dealing with crop production in addition to milk production and the other was approximately 88% of them were dealing with milk production for more than 5 years. Moreover, it is fact in Turkey that specialization in livestock sector is rare and this affects economic improvement negatively (13).

In social life, while patriarchal family is composed of three generation living together, nuclear family is defined as a union which is composed of mother, father and children, if exists. As in Aydın (14) and Amasya (12), it was found that the family type of the producer didn't affect to support or oppose innovations.

The standard of living which is an indicator of socio-economic structure is also an important factor in buying and practicing new production technologies. In this research, a parallel relationship was found between the producers' life standard and adopting innovations. That is, producers who have a higher life standard can

adopt innovations more easily. Although the results in Amasya (12) were parallel to this fact, the ones in Aydın (14) showed that the standard of living didn't affect innovations.

Social participation means many actions such as people's connection with some foundations which have social and economic aims or their membership to them. It means that, the producers who participate in these kinds of activities are more successful in receiving information, learning the details and practicing the innovations. The fact that all of the enterprises involved in the research were the members of the union, was an important factor for their being innovator. Producers received some help from their union in learning and practicing some of the innovations. The importance of the level of social participation in learning innovations was also stated by other researches (1, 9).

In addition to this, producers who leave their surroundings and contact with outer foundations for various aims were noticed to be more successful in adopting innovations. In other words, the more the enterprise became open to outer cultures, the more the level of adopting innovations increased. These results were parallel to the other researches (1, 2, 5).

The ability of empathy means people's putting themselves in others' shoes and their capacity of understanding others' duties and responsibilities. In order to analyze this ability, producers were asked about what they would do if they had been President, Prime Minister, Minister of Agriculture or Governor of a Province. The answers to this question showed that there was a relationship between the ability of empathy and the level of adopting innovations. That is to say, producers who had the ability of empathy could adopt the innovations more easily. Similar results were also observed in Aydın (14) and Amasya (12).

It is not that much easy to educate producers about modern technologies and management as thought by someone. At this point, mass media tools become very valuable. Even publications about occupations could be more effective in transmission of information. However, this also depends on the producers' interest in following those kinds of publications. In our study, it was observed that although the number of the producers who follow those publications was low (15%), all of them were at medium and high level in adopting the innovations. Shortly, it could be said that following these publications increased learning the innovations and practicing them. A strong relationship between mass media tools and adopting innovations was observed in other researches, as well (1, 2, 4, 11).

It could be concluded that adopting the innovations was easy and fast by the dairy cattle enterprises which have enough working capacity, deploying experienced young and middle aged workers with high education levels, having a high level of social participation, ability of empathy, open to outer cultures and use mass media tools in Afyonkarahisar. Taking these results into account, the present position of the producers should be analyzed before presenting them new technologies and facilitate their adopting and practicing the innovations. Hence, the producer could benefit the new technology effectively.

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