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Acceptance of new scientific developments in practical animal production:

A major problem of technology transfer in farm management.

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Summary

Application of scientific results and developments in pluralistic societies based on free enterprises is determined by principles of offer and demand. Scientific innovations are the offers, met by different levels of acceptance in practice. Practical requirements and, consequently acceptance, are influenced by various factors, like applicability, economic perspectives, biological and ecological aspects, legal obligations, ethical principles and, last not least, attitudes of society members and groups. With respect to animal production, the following categories are of major importance:

- Acceptance of procedures by breeders, producers and veterinarians
- Acceptance of products by consumers, traders and processing institutions
- Acceptance of innovations in general

Relevant aspects are elucidated by means of examples on biotechnological developments in agriculture and animal production.

1. Introduction

Practical application of scientific results and developments in pluralistic societies based on free enterprises is determined by principles of offer and demand. Offers are defined as research results presented by scientists, facing different demand situations on farms. The mutual relations may be characterized as follows:

- Research projects may be planned according to already existing practical demands for their results. Relevant examples are, for instance, investigations to meet legal requirements in the field of animal welfare. Projects of this kind usually are of applied scientific nature.
- Results obtained in basic science may outline new procedures, which however are not readily applied in praxi because of their non-conventional character. Examples are new breeding techniques (cloning and gene transfer) resulting from research in gene- and biotechnology. In this case a demand has to be developed, so the use of new procedures can be made possible.
- There are many transitions between these two categories, both from the direction of scientific offers and from practical demands as well.

While the scientific opportunities offered derive from independent research, the practical requirements depend on and are influenced by many factors.

The most prominent of these are:

- Applicability, economical importance and perspectives
- Biological/ecological aspects, legal obligations and ethical demands
- Acceptability by the persons involved and by society.

The first two groups of factors can be defined objectively or normatively, provided that the research on new techniques extends to a proper estimation of the consequences of application. They correspond with the main goals to be achieved in animal production (Fig. 1).

The acceptance of scientific developments in practical farming is difficult to predict. It is dependent on trends in public opinion as well as personal attitudes, influenced by e.g. professional advice and mass media. The interrelationships are outlined in Figure 2. This multifaceted complex shall be discussed using the acceptance of biotechnical approaches in animal production.

2. Acceptance of biotechnical procedures

The following categories are of major importance in this context:

- Acceptance of procedures by breeders, producers and veterinarians
- Acceptance of products by consumers, traders and processing institutions
- Acceptance of lines in biotechnical developments by society.

Although these categories are interdependent, each of them has its own characteristics (SMIDT, 1989).

Acceptance by breeders, producers and veterinarians

Breeders and producers, provided they are not principally opposed to biotechnical methods, are primarily interested in biotechnology as a tool for the optimization of essential factors of breeding, management, hygiene etc. The application of biotechnical procedures is orientated then with respect to the size of units, their structures and forms of organization and the goals to be achieved in animal production. Since the latter aims at high economic returns, market- and price-relevant consumer attitudes get considerable and increasing attention. A good example for this is the application of rbST. The refusal of dairy breeders and milk producers against using rbST, at least in our country, is largely due to their concern about the product

image of milk. The applicability of biotechnical measures, therefore, depends on a successful instruction which is orientated on latest development and knowledge.

An inquiry among dairy farmers, carried out on request of the German Bundestag, resulted in only 12% of the farmers polled being willing to try rbST-application on their farms, if possible. 74.6% turned out to be reluctant in this respect (DEUTSCHER BUNDESTAG, 1989; ISERMEYER & DE HAEN, 1989).

Acceptance by consumers, traders and processing institutions

Product quality is the essential criterion for traders and consumers for accepting biotechnical methods. Quality factors comprise, among others, aspects of the suitability for processing, the tastiness as well as presumed or substantial health hazards for the consumers. A relatively new, more subjective component extends the definition of quality, including the production systems employed.

With respect to health risks the general public is exposed to a multitude of informations, posing differentiation problems and often giving more insecurity rather than substantial explanation to the consumer. "Hormone", for instance, has become a bad name, which is associated with the equalization of all hormones with respect to animal production, irrespective of significance, efficiency, application and natural occurrence in the body. It is for this reason that the acceptance of biotechnical measures by consumers is far more difficult to predict and has to cope more with imponderables than is the case with producers.

In a study conducted by the German Federal Research Center of Agriculture (SCHRIFTENREIHE BMELF H 376, 1989) consumer associations ranked resentments against gene technology and intensive animal production highest among the reasons for their rejection of rbST-application in milk production. In the same groups 63% of those polled would recommend consumption of "rbST-free" milk, 96.4% of those interviewed would recommend to give preference to milk from "biological farming". 70% of consumers and 87.5% of dairy representatives expected a reduction in milk marketing of roughly 10%.

Acceptance by society

The acceptance of biotechnological developments in pluralistic societies depends on majority opinions voiced by different social fields and groups, summing up individual

sentiments. The analysis of this form of acceptance is not uniform. The results of public inquiries depend largely on the kind of questions asked. Expert opinions are often tainted professionally and may thus arrive at contradictory views. A DELPHI-inquiry on bio- and gene technology conducted by the Social Research Center in Dortmund on behalf of the German Federal Ministry of Nutrition, Agriculture and Forestry resulted in controversial appraisals of government regulations, public participation in decision finding and future consequences by specific population groups. The groups questioned comprised scientists working in the fields of bio- and genetechnology, industrial experts, agricultural scientists, plant and animal breeders, ecologists and members of agricultural organizations (NEUBERT, 1990). The spectrum of opinions voiced extended from unrestricted recommendation over a multitude of mixed feelings to categorical opposition.

With respect to possible ecological, economical and social advantages of biotechnical procedures the representatives of industry, breeders and biotechnological science were the most optimistic groups, whereas ecologists can hardly recognize any advantage, except for economy. The other expert groups polled were ranking between these 2 positions.

In their assessment on factors influencing the development of biotechnology in agriculture the experts polled named in the first place (50 - 60%):

- National and international legal and political conditions,
- consumers' attitudes towards production systems and products,
- international competition,
- ethical and cultural norms,
- aspects of environmental protection.

Acceptance or rejection of biotechnology in animal production by the society are not fixed entities but are highly variable and subject to influences.

The general public has without doubt some basic scepticism, which centers on gene technology. The achievement of less biased sentiments and of better differentiated view points demands the continuing efforts of educationally trained advisors. Such differentiations may be related to

- biotechnical procedures
- goals of biotechnical measures
- areas of application and
- regional and/or structural aspects.

Differentiations of acceptance could constructively contribute to a concentration of biotechnical developments on sensible categories of application.

Individual opinions and acceptance by the society are considerably influenced by mass media. For them, biotechnology is indeed an attractive field, the description of which makes a fascinating story, varying however, from onesided negative apostrophies to the efforts for objective expert information, and including all possible views inbetween.

BEUSMANN et al. (1989) stated, that the acceptance of new biotechnological developments by the general public is essential for their application. Acceptance may become evident mainly by salability of the products and by majority votes in legislation.

3. General assessment of the acceptance of biotechnical measures

In summarizing the various forms and motives of acceptance, the following conclusions can be drawn:

- Numerous routine practices in animal breeding and management include biotechnical measures. They comprise, e.g. estrus-, cycle- and pregnancy diagnosis as well as artificial insemination, all of which are readily accepted, because their necessity and usefulness are obvious.
- Other important techniques such as embryo transfer, long-term cryoconservation of germ cells and embryos as well as embryo splitting are viewed critically but are in essence usually accepted.
- A last category, e.g. the production of transgenic livestock, still meets with profound scepticism, although the motives for it are quite at variance.

Future developments in the acceptance or the rejection of new biotechnical methods depend on the progress of integrated, biotechnological research, which must include cost/gain analysis and assessment of possible consequences (SMIDT, 1988). According to BEUSMANN et al. (1989), a multidisciplinary approach is indispensable for tackling the problem.

Acceptance or rejection of new biotechnological methods will in future depend to a lesser extent on the availability of techniques, but rather on the weighing of chances, risks, potential consequences and on ethical aspects. Solid knowledge and its sensible conveyance will help to differentiate between sensible, questionable and hazardous forms of application (SMIDT, 1990).

4. Important aspects concerning advice on the application of biotechnical procedures

1. Basic prerequisite for successful advice is a solid knowledge of methodological developments and practical requirements.
2. Objective, non-emotional evaluation of application fields, advantages, perspectives and novel developments.
3. Delineation of legal, ethical and political aspects of biotechnological procedures in animal production.
4. Advice according to deduced decisions and goals with respect to technology transfer in farm management.

The general goal of biotechnological advice then has to be to adapt the level of know how of the farmer to the demands raised by new scientific findings.

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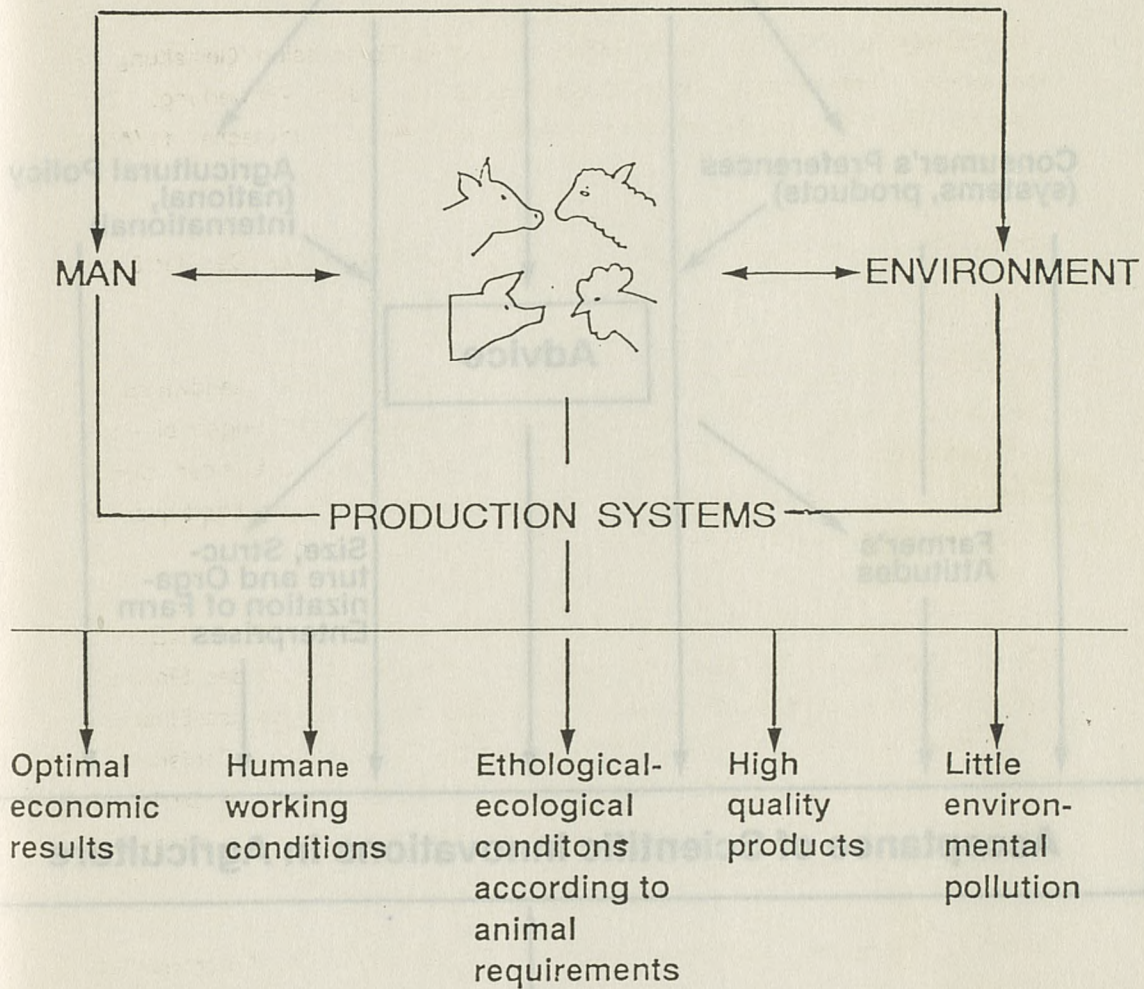


Fig. 1: Significant goals of modern animal production

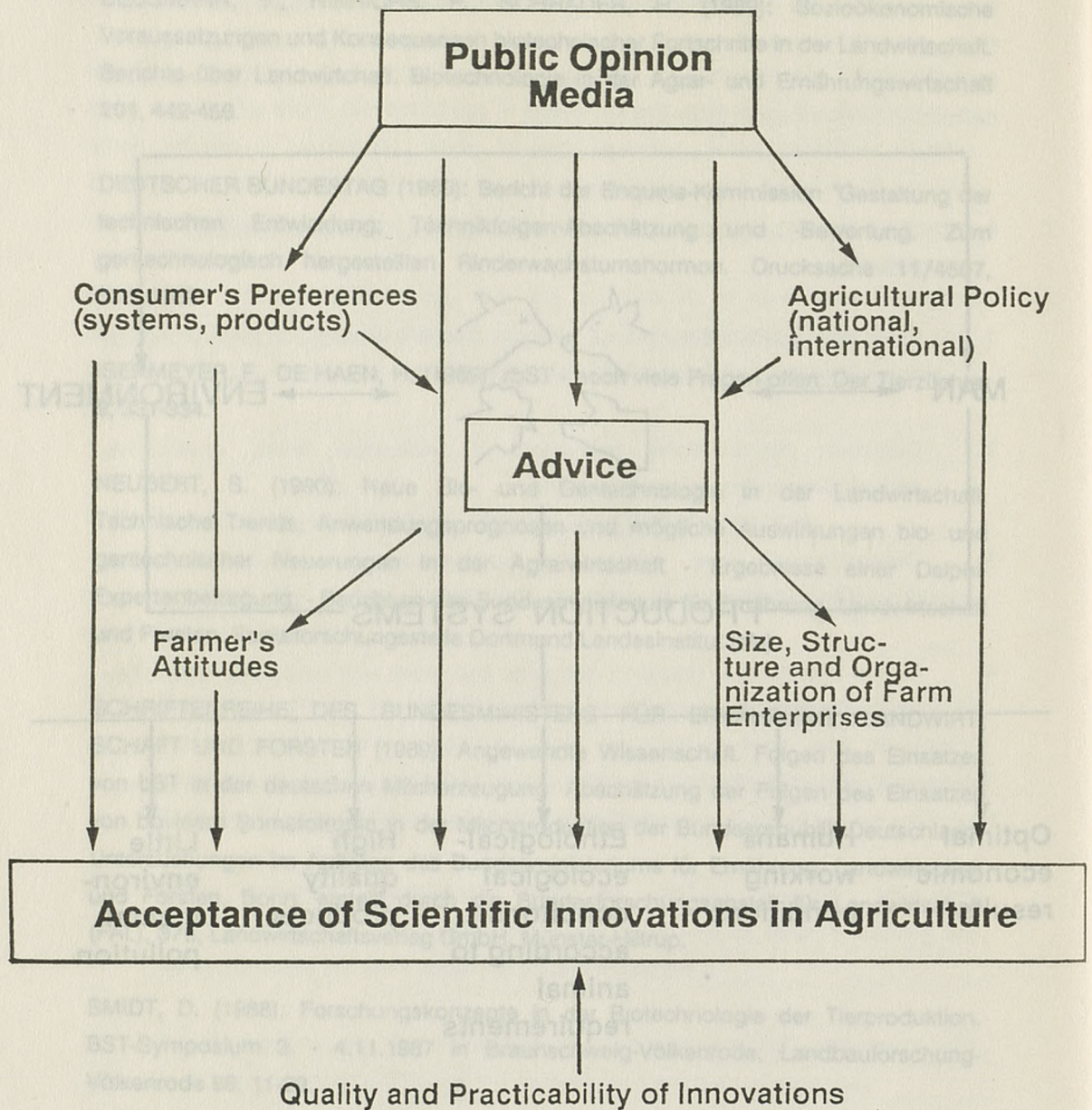
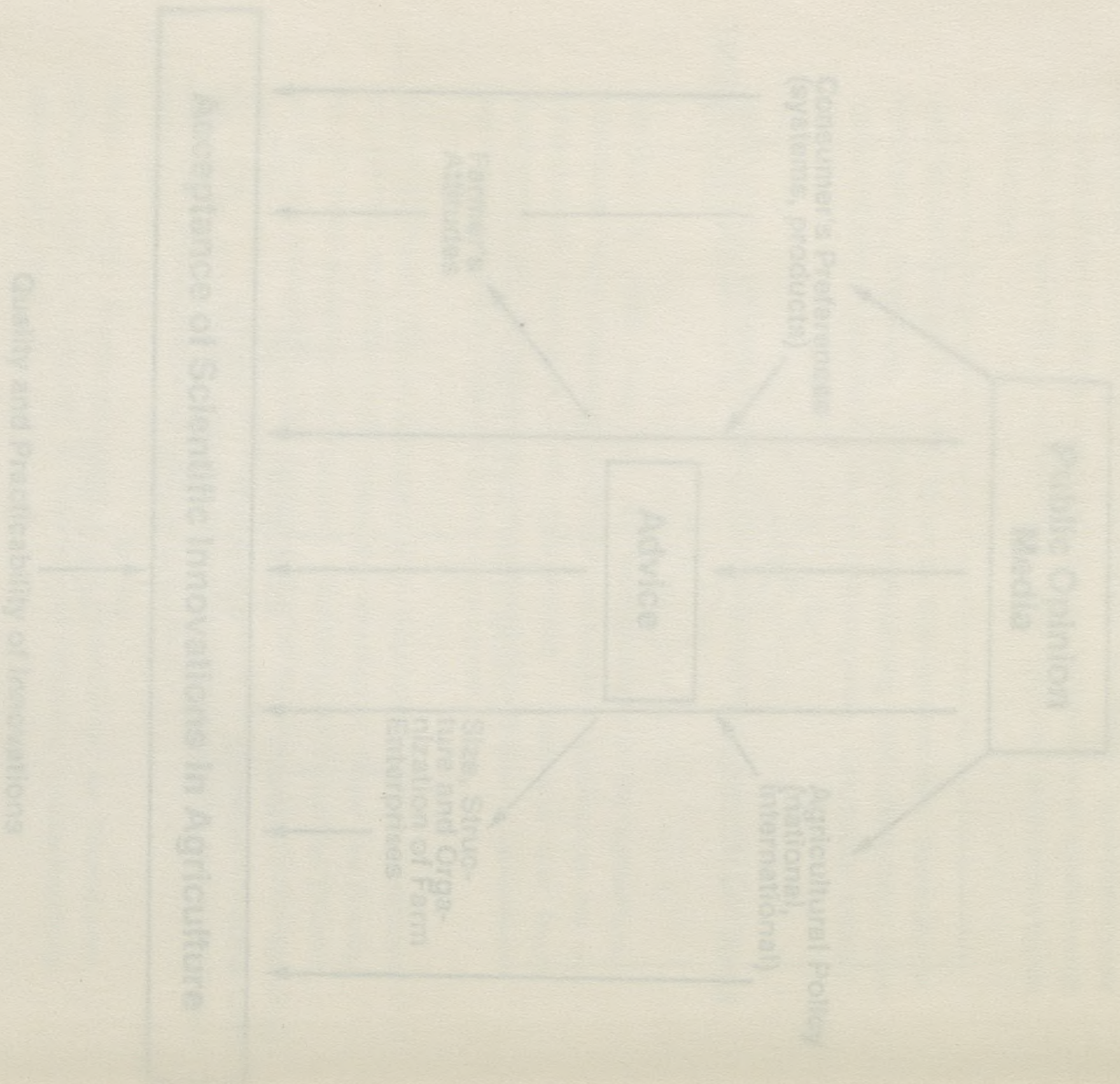
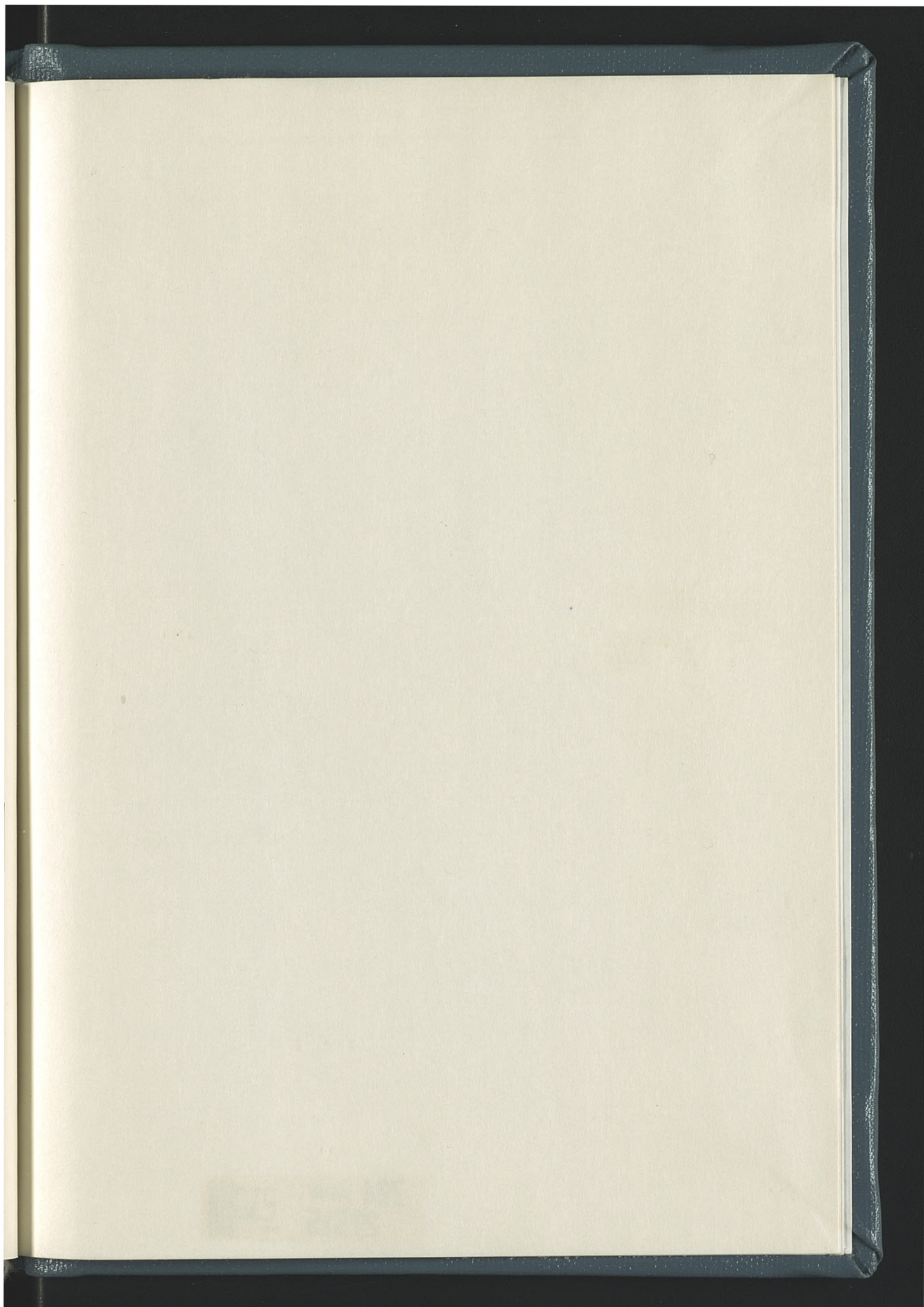


Fig.2: Influences and interdependences with respect to the acceptance of scientific innovations in agriculture.



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