

Editor Preferences for the Use of Scientific Information in Livestock Publications

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Abstract

Editors of monthly livestock publications were surveyed to determine their perceptions of the amount, type, and sources of scientific information used in their respective publications. The most important scientific topics to editors were animal health, management, and breeding and genetics. Editors' identification of the most important topics agreed with previously reported audience perceptions of information needs and previous studies of information provided by agricultural journals, although lower rankings of policy and worker/employee safety information contradicted the importance of magazines identified by audiences in previous studies. The importance of certain gatekeeping criteria to editors reflected the general standards of accuracy and newsworthiness found in journalism, as well as editors' perceptions of their livestock audiences' information needs. A majority of editors recommended two to four sources be used in a scientific story, with university faculty or staff, Cooperative Extension, veterinarians and the USDA identified as the top sources. The number and sources of information preferred coincided with source characteristics as criteria for using scientific information. The specific sources most preferred by editors also demonstrated the orientation of editors with other gatekeepers and the audience in selecting appropriate information for publication. Scientific information published was similar to editors' rankings of topic importance and source preferences. Scientific information was written for the average producer, and a majority of editors reported publishing scientific stories in at least one-half of issues. The depths and overall use of scientific information also supported the importance of delivering understandable scientific information to their agricultural audiences.

Introduction

Information has become one of agriculture's most valuable resources (Maddox, 2001). Information is critical to decision-making processes, and agricultural producers' demands for information have amplified with increased market instability, increased complexity in production technologies, and an enhanced need for financial planning and control (Ortmann, Patrick, Musser, & Doster, 1993). To meet their information needs, farmers and ranchers use sources of agricultural media an average of 6.2 hours per week, with one in four using media 10 or more hours per week (Harris Interactive, 2005).

The types of media and other information sources preferred by agricultural producers are as diverse as the types of agricultural production they pursue, although print sources consistently have received high rankings as information sources (Gloy, Akridge, & Whipker, 2000; Harris Interac-

tive, 2005; Maddox, 2001; Suvedi, Campo, & Lapinski, 1999). Specifically, magazines have been shown to be an important source for various types of agricultural information across demographic and socioeconomic groups (Brashear, Hollis, & Wheeler, 2000; Brown & Collins, 1978; Bruening, 1992; Gloy et al.; Harris Interactive; Jones, Sheatsley, & Stinchcombe, 1979; Maddox; Ortmann et al., 1993; Suvedi et al.). Nearly all farmers and ranchers read agricultural magazines and newspapers at least once a month, and agricultural producers ranked magazines among the most credible, timely, knowledgeable, and respected sources of information (Harris Interactive).

Agricultural audiences have long acknowledged magazines as important sources of information related to management, production practices, and policy (Batte et al., 1990; Brashear et al., 2000; Brown & Collins, 1978; Foltz et al., 1996; Ford & Babb, 1989; Harris Interactive, 2005; Jones et al., 1979; Murphy, 1960; Ortmann et al., 1993; Schnitkey et al., 1992). Specific information needs consistently recognized by farmers and ranchers include animal nutrition, animal health, markets, management, technology, and genetics and reproduction (Foltz et al.; Murphy). Much of this information could be considered scientific, defined by Agnes et al. (2003) as “based on, or using, the principles and methods of science” (p. 1275).

Gatekeepers determine the type, usefulness, and sources of agricultural information reaching farmers (Shoemaker, Eichholz, Kim, & Wrigley, 2001). Lewin (1947) originally identified gatekeepers as people through which information or goods must pass, who in turn influence the flow of ideas through society. Today, gatekeeping in the media is described as a process or series of decision points through which numerous messages are shaped into the few that are transmitted by news media (Shoemaker et al.). That process includes reporters, editors, news executives, and managers (Dimmick, 1974), who face a variety of influences on their decisions.

Studies of gatekeepers have demonstrated that their decisions are influenced by age, education, organizational position, relations with colleagues, personal values, community integration, publisher attitudes, and the routines of news work (Donohew, 1967; Johnstone, Slawski, & Bowman, 1972; Shoemaker et al., 2001; White, 1950). Organizational forces often have more influence on gatekeeping decisions than individual forces (Shoemaker et al.), with editors and publishers making final decisions about information that reaches the public. The potential influence of organizational culture and perceptions on editors' decisions makes it imperative that editors are in tune with audiences' perceptions of their needs (Donohew; Trotter, 1975).

In the magazine industry, the influence of the editor as a gatekeeper may be particularly strong, as magazines typically have smaller staffs than newspapers. This is particularly true with agricultural publications (Fowler & Smith, 1981). Magazine editors also tend to be more cognizant of what information they want a specialized magazine audience to receive (Fowler & Smith), which makes magazine editors an ideal subject for use in gaining insights into perceptions about the use of specific information for selected audiences. Those insights then can be used to refine the media's role in inducing images, perceptions of reality, and individual uses of information (Wiegman, Gutteling, Boer, & Houwen, 1989).

This study sought to determine the use of scientific information in monthly livestock magazines to assist editors, writers, and sources of scientific information in coordinating an efficient flow of information from scientific professionals to livestock producers. For this purpose, scientific information was defined as information derived directly from a scientific research study or formal experience, or from professional training conducted by parties in either the public or private sector. The study was guided by four objectives:

1. Determine the importance of selected scientific topics to editors of livestock publications.
2. Determine gatekeeping criteria editors of livestock publications used to determine the use of scientific information.
3. Determine editors' preferences for the use of sources of scientific information.
4. Determine editors' perceptions of the amount, type, and sources of scientific information published during one complete volume of their respective publications.

Methods

Editors of monthly magazines registered as 2005 publication members of the Livestock Publications Council and those publishing more than six issues per year were selected for this study. The population size was 54 editors, and a census was used due to the small population size.

Descriptive survey methodology was used to determine the use of scientific information in livestock publications. Survey responses were obtained using a Web-based questionnaire designed according to the principles of the Dillman Tailored Design Method (2000). Questions were adapted from a survey of daily newspapers by Cartmell (2001) and a literature review of sources of information preferred by agricultural producers. Information collected using the survey included editors' rankings of gatekeeping criteria; preferences for sources of scientific information; topics of and sources used for scientific information; depth of scientific information published; frequency of publication of scientific information; and demographics related to personal characteristics, career experience, and publication characteristics.

Types of questions included ranked items, multiple choice, numeric, and scaled items. Two scales ranging from one to five were used. For the first scale, one indicated broad scientific information with few details was included in stories, and five indicated a significant amount of scientific information was included in stories. Three served as a midpoint at which technical information included in stories was written for the average producer. For the second scale, one indicated scientific stories were published two times or fewer, and five indicated at least one scientific story was published in each issue of the publication. Three was a midpoint at which scientific stories were published in approximately one-half of issues.

A panel of experts reviewed the survey instrument to establish face and content validity. In addition, the survey instrument was pilot tested using editors of weekly livestock publications that were 2005 publication members of the Livestock Publications Council. Pilot test data were used to calculate a Cronbach's alpha of 0.86 for scaled items.

Editors initially were contacted via telephone during a three-day period during a normal work week. Editors who verbally agreed to complete the survey were sent a personalized e-mail on the day of the call further explaining the survey and providing the link to the survey. A personalized e-mail reminder was sent to editors seven days after the initial phone calls, and the data collection period ended three weeks after the initial phone calls. Thirty-nine responses were obtained during the data collection period for a response rate of 72 percent.

Nonresponse error was controlled for by comparing the characteristics of early and late respondents to the survey, using the later 50 percent of respondents as the late respondents (Lindner & Wingenbach, 2002). No differences in the means of selected items were found between the early and late respondents.

Quantitative data were analyzed using the Statistical Package for Social Sciences 11.0 for Mac OS X. Descriptive statistics, including means, standard deviations, modes, ranges, frequencies, and percentages, were used to interpret the data and describe the editors' responses.

Findings

The importance of scientific topics to editors

Editors (N = 39) ranked the relative importance of 14 scientific topics from a provided list (see Table 1). Animal health was ranked first overall and received a ranking of one, two, or three from a majority of the editors. Management was ranked second and received the same number of first-place rankings as breeding and genetics, which was third. Following breeding and genetics were, in order of importance based on means, animal nutrition, marketing, commercial production, research, financial, policy/regulatory, training/education, food safety, animal welfare, worker/employee safety, and human nutrition.

Table 1
Importance of Specific Topics

Topic	<i>M</i>	Order
Animal Health	3.42	1
Management	3.83	2
Breeding and genetics	3.91	3
Animal nutrition	4.97	4
Marketing	5.34	5
Commercial production	6.06	6
Research	7.36	7
Financial	7.41	8
Policy/regulatory	8.66	9
Training/education	9.14	10
Food safety	9.31	11
Animal welfare	9.50	12
Worker/employee safety	10.36	13
Human nutrition	11.31	14

Gatekeeping criteria

Editors (N = 39) ranked the importance of eight gatekeeping criteria to their decisions about the use of scientific information in their publications (see Table 2).

Accuracy of content was the most important criteria for 30.8 percent of editors and was ranked first according to the means, followed closely by trustworthiness of sources. Interest to the audience was the third-most important criterion, followed by impact of content on the industry, timeliness of content, whether content improved the quality of information provided to the audience, quality of writing, and availability of space. Timeliness of content was the only criterion that did not receive a ranking of one from at least one editor.

Table 2
Importance of Gatekeeping Criteria

Criteria	<i>M</i>	Order
Is the content accurate?	2.64	1
Do I trust the source(s) of the information?	2.85	2
Is the content of interest to the audience?	3.79	3
Does the content have an impact on the industry?	4.05	4
Is the content timely?	4.76	5
Does the content improve the quality of information provided to the audience?	5.05	6
Is the content well-written?	6.21	7
Is space available?	6.67	8

Editors' preferences for sources of scientific information

Editors (N = 39) estimated the average number of sources they recommend a writer use when reporting scientific information. Twenty-six editors recommended two to four sources be used in a scientific story, although eight editors recommended only a minimum of one source and four editors indicated an average number of sources was not always encouraged. One editor noted the number of sources to be used was left to the judgment of the writer.

Editors (N = 39) also identified from a provided list of sources those they would suggest to writers seeking scientific information (see Table 3). University faculty or staff was selected by all editors as a source of scientific information, followed closely by Cooperative Extension personnel, veterinarians, and USDA representatives. The top four sources were selected by more than 80 percent of editors. More than half of editors selected industry participants or producers and breed organizations, which were followed by agribusinesses, independent consultants, commodity groups, nonbreed industry organizations, and private interest groups. One editor indicated sources of information recommended would depend on the subject matter.

Table 3
Sources Suggested for Use in a Scientific Story

Source	<i>n</i>	%
University faculty or staff	39	100.0
Cooperative Extension (Extension Agent/Specialist)	36	92.3
Veterinarian(s)	35	89.7
USDA	33	84.6
Industry participant(s) or producer(s)	23	59.0
Breed organization(s)	21	53.8
Agribusiness(es)	19	48.7
Independent consultant(s)	17	43.6
Commodity group(s)	14	35.9
Non-breed industry organization(s)	11	28.2
Private interest group(s)	7	17.9
Other	2	5.1

Publication of scientific information

Editors (N = 39) reported the topics (see Table 4), number and type (see Table 5) of sources, depth, and overall use of scientific information in their publications.

The topic covered by the largest number of publications was breeding and genetics, followed by animal health, animal nutrition, research, management, commercial production, and marketing. More than half of the magazines included information on these topics. Slightly less than half of the publications included information about policy/regulatory, animal welfare, financial, and food safety; one-third of the publications covered training/education, human nutrition, and worker/employee safety. Two publications indicated information was provided about other scientific topics. A majority of editors indicated two to four sources were cited in scientific stories published during 2005, while about one-third of the editors reported a minimum of one source was used. Three editors did not know how many sources were used or indicated sources were not used.

Table 4
Topics Published during 2005

Topic	<i>n</i>	%
Breeding and genetics	38	97.4
Animal health	36	92.3
Animal nutrition	33	84.6
Research (animal; ongoing or specific)	30	76.9
Management	29	74.4
Commercial production	27	69.2
Marketing	25	64.1
Policy/regulatory	19	48.7
Animal welfare	18	46.2
Financial	17	43.6
Food Safety	17	43.6
Training/education	14	35.9
Human nutrition	13	33.3
Worker/employee safety	11	28.2
Other	2	5.1

All sources of scientific information in the provided list were used during 2005, according to the editors. University faculty or staff were used in the most publications, followed by Cooperative Extension, veterinarians, the USDA, industry participants or producers, agribusinesses and/or breed organizations, nonbreed industry organizations, independent consultants, commodity groups, and private interest groups. One editor indicated government sources were used, and one indicated none of the sources listed were used.

A majority of the editors indicated scientific information published during 2005 was “written for average producers” and “included technical information in a format average producers can apply in their operations.” Seven editors indicated information was more technical than information written

for average producers, and three indicated information was written more broadly than information that could be applied by the average producer. Two editors indicated published scientific information was broad and included few details, and none of the editors reported publishing scientific information that was technical.

Slightly fewer than one-third of editors reported publishing scientific information in approximately one-half of their issues, and slightly fewer than one-third of editors reported at least one scientific story was published in each issue. Seven editors indicated scientific information was published in fewer than half of issues, while five reported publishing scientific information in more than half of issues but not in every issue. Four editors indicated scientific stories were published two times or fewer.

Table 5
Sources Used in Scientific Stories Published during 2005

Source	<i>n</i>	%
University faculty or staff	36	92.3
Cooperative Extension (Extension Agent/Specialist)	35	89.7
Veterinarian(s)	28	71.8
USDA	27	69.2
Industry participant(s) or producer(s)	23	59.0
Breed organization(s)	22	56.4
Agribusiness(es)	22	56.4
Nonbreed industry organization(s)	17	43.6
Independent consultant(s)	15	38.5
Commodity group(s)	14	35.9
Private interest group(s)	9	23.1
Other	2	5.1

Discussion

The importance of scientific topics to editors

Editors agreed with audience perceptions of information needs established in previous studies (Batte et al., 1990; Brashear et al., 2000; Brown & Collins, 1978; Foltz et al., 1996; Ford & Babb, 1989; Harris Interactive, 2005; Jones et al., 1979; Murphy, 1960; Ortmann et al., 1993; Schnitkey, Batte, Jones, & Bottonogno, 1992). Specific information needs consistently recognized by farmers and ranchers include animal nutrition, animal health, markets, management, technology, and genetics and reproduction (Foltz et al.; Murphy), while magazines have not been identified as a primary source for current financial information (Ortmann et al.). Editors in this study identified animal health, management, and breeding and genetics as the most important topics, while financial information was ranked comparatively lower.

Agricultural producers frequently selected topics such as animal health and nutrition as information necessities, which could have resulted in the lower importance of policy/regulatory and worker/employee safety information. The ranking of policy/regulatory lower in the list also may be due

to a perception by editors that policy information is not as scientific as the topics ranked above it, although science often plays a key role in the establishment of policies that impact agricultural producers.

Editors appeared to possess a strong understanding of livestock audience information needs. Trotter (1975) demonstrated audiences who most agree with editors tend to believe publications are edited for people similar to themselves, which would hold true for livestock publications that are generally limited by commodity or geographical interest (Schlebecker, 1983). Organizational forces, such as definitions of news and relationship to specific industries, also exert more influence on the selection of topics than editors' individual perceptions and experiences (Shoemaker et al., 2001). Communicators in livestock organizations are more likely to have accurate perceptions of specialized livestock audiences due to their respective organizations' positions within the livestock industry and their personal industry experiences, although livestock publications editors may underestimate the importance of livestock magazines in the flow of information from research origins to applicable concepts.

Gatekeeping criteria

The importance of certain gatekeeping criteria to editors mirrors the high standards for accuracy and newsworthiness found in the field of science journalism (Blum & Knudson, 1997), as well as editors' perceptions of livestock audiences' information needs. Trustworthiness of source is closely related to accuracy of content, and source credibility often dictates the caliber of a story (Blum & Knudson).

Editors appeared to realize the influence sources have on the value of a story to the audience, while the positioning of interest to the audience and industry impact of information relative to other criteria show livestock publication editors grasp the concept of providing useful information to agricultural producers. Earlier studies demonstrated audience responses to scientific information increase with relevance to the reader and timeliness (Grunig, 1980; Murphy, 1960).

Editors' experiences in agriculture and livestock industries may influence their opinions of the importance of providing content connected to audience needs. The weight given to the value of scientific content to the audience and industry may result from views intrinsic to agricultural organizations (Shoemaker et al., 2001), although editors' decisions ultimately are based on their entire collection of experiences (Fowler & Smith, 1981).

Fowler and Smith (1981) also observed the decisions of magazine editors may carry more influence than decisions of gatekeepers in other mass media because the staffs of magazines are typically smaller, which promotes more direct interaction between editors and the selection of magazine content. As the staffs of many livestock publications are considerably smaller than staffs found in the mainstream media, the role of individual experiences and opinions increases in the livestock publications industry and appears to have led editors to consider stylistic, quality of writing, and space constraint concerns less important than relevance of information.

The numerically close means of accuracy and trustworthiness of sources illustrated the nearly equal importance of some gatekeeping criteria and supported previous research that demonstrated more than one criterion often is employed simultaneously in gatekeeping decisions (Dimmick, 1974). Likewise, the comparable means of interest to the audience and impact, timeliness and quality of information, and quality of writing and space availability demonstrated gatekeeping criteria may be considered as groups composing tiers in the decision-making process, with individual criteria on a similar importance at that level of decision-making.

Editors' preferences for sources of scientific information

The number and sources of information preferred by editors complemented the value of accuracy and trustworthiness of sources as criteria for using scientific information. By requiring multiple sources, editors allow for confirmation of information by multiple sources, ensure all potential aspects of a story are presented, and may diminish readers' doubts about objectivity.

The specific sources most preferred by editors also demonstrated the orientation of editors with other gatekeepers and the audience in selecting appropriate information for publication, and the worth of certain sources of scientific information is validated by their use in both livestock publications and the mainstream media. Editors showed a considerable preference for the top four sources, including university faculty or staff, Cooperative Extension, veterinarians, and the USDA. University faculty or staff was selected by all editors in this study, and those sources have been ranked highly by audiences and gatekeepers in previous research (Brown & Collins, 1978; Stringer, 1999). As the roots of many modern agricultural production methods can be found in university research and Cooperative Extension education programs, some bias toward these sources of information may exist in agriculture similar to bias observed as science writers formed relationships with scientists (Mazur, 1981). The preference of editors for the USDA as a source of information conflicts with previous research about gatekeepers' preferences, but agrees with the value placed on government information sources by audiences (Brown & Collins; Stringer; Jones et al., 1979).

Most of the sources selected less by editors, including industry participants or producers, breed organizations, agribusinesses, consultants, commodity groups, nonbreed industry organizations, and private interest groups, have been indicated over time as important information sources by large-scale family farmers (Brown & Collins, 1978), Ohio commercial farmers (Batte et al., 1990), large corn belt farmers (Ortmann et al., 1993), and members of agricultural organizations (Harris Interactive, 2005). Similar to the results of this study, sources other than educational institutions and government agencies were ranked lower by news and agricultural periodicals (Stringer, 1999; Whitaker & Dyer, 2000), although editors of livestock publications differed from farmers and ranchers who ranked agricultural dealers and retailers highly on credibility, timeliness, and knowledge of agricultural markets (Harris Interactive).

Publication of scientific information during 2005

Based on the rankings of topic importance, editors seemed to be aware of audience information needs, and the topics published during 2005 reinforced the apparent accuracy with which editors understand their audiences. The importance of specific topics to editors and in publication also agrees with editors of dairy publications who listed breeding technologies, animal health, production practices, animal nutrition, and management as important themes about which their publications needed to provide information (Evans, 1981). The similar rankings of importance and publication of topics despite variations in responding publications' audiences also indicated a diverse general livestock industry audience has similar information needs, and editors' high rankings of interest to and impact of content on the audience as gatekeeping criteria indicated meeting these needs with accurate, credible information is a priority in the livestock publications industry.

The use of multiple sources for scientific stories supported the importance of objectivity and providing appropriate context for information so readers can be educated rather than influenced. Editors' preferred sources for information mostly paralleled sources reported to be used during 2005. The reliance of editors and writers on top sources may be due to the nature of the topics and the need for accessible, unbiased information. Breeding and genetics, animal health, animal nutrition, and re-

search information may be explained best by the originators of the information or perceived experts, such as universities or veterinarians. Gatekeepers with backgrounds or experience in agriculture also may tend to rely on traditional sources of agricultural information, as demonstrated by the preferences of editors for those sources and the use of those sources.

The level of information published during 2005 agreed with the observation of Grantham and Irani (2004) that information should be provided at a level usable by producers with average educational backgrounds. Specialized audiences, such as livestock producers, may understand scientific terms better than broader audiences due to their more frequent use of such information, although communicators still can provide concepts in lay terms with appropriate context and create applicable principles for producers.

A majority of publications used scientific information in more than half of 2005 issues, while only four published scientific information two times or fewer. Variation in the use of scientific information resulted from differences in the purpose of the publications, although their role in providing modern, usable information agrees with Schlebecker's (1983) observation that the function of agricultural journals is to bring timely, valuable items to the attention of readers. These results demonstrated the significance of science in the livestock industry and editors' comprehension of what information will best help their audiences.

Recommendations

As gatekeepers, editors of livestock publications need to maintain their awareness of audience needs. Perceptions of audience needs may be enhanced through strong connections with the livestock industry, although editors must preserve objectivity to continue providing complete, accurate information to readers. The best editors should look to the future of their industries and provide information producers need to reach production goals successfully.

In selecting topics for publication, the role of magazines in the decision-making processes of farmers and ranchers should be considered. Editors may be unaware of their publications' importance in the livestock industry relative to other media, so a review of industry studies may be useful to many gatekeepers.

Accuracy and providing useful content appeared to be the primary goals of editors' gatekeeping decisions, and editors should continue to ensure accuracy of content and avoid appearances of bias through careful selection of sources. Providing useful content also should continue to be a primary goal for gatekeepers in the livestock publications industry.

Livestock magazines should continue operating under the goal of providing knowledge to producers rather than trying to influence producers. This goal may be refined and manipulated to meet the objectives of associations and other organizations that own particular publications, but such groups should provide essential information with enough context to allow producers to develop their own attitudes.

Editors should be conscious of various organizational and personal influences on their gatekeeping decisions. Institutional perceptions will become a part of editors' personal opinions and experiences, and editors and organizations should take steps to ensure objectivity in gatekeeping decisions is maintained. Prior experiences in agriculture or the livestock industry may be particularly strong influences on editors' selection of topics and sources, and employing a system of multiple criteria for making decisions will help editors overcome innate personal biases.

Sources perceived as credible by the audience should be used to sustain the trust of magazine

their agricultural roots so producers are presented with information they may find useful but would not normally seek.

The use of multiple sources in stories is an important tool for ensuring objectivity and gaining readers' trust, and a variety of sources adds extra dimensions to information that create a complete picture incorporating context and applicable principles. Editors need an understanding of how best to achieve this, along with an understanding of audience perceptions of sources, to facilitate efficiently the flow of information from scientific sources to producers.

The use of scientific information reported by editors demonstrated the significant impact science has in the livestock industry, further supporting the need to provide pertinent scientific information to producers. Specialized publications may not focus on topics directly related to science, but as an industry, livestock publications need to ensure producers receive adequate information to uphold the competitiveness of U.S. livestock production.

Gatekeepers and other communicators involved with livestock publications should aim to gain experiences in the livestock industry not directly related to their jobs as communicators. These experiences may enhance gatekeepers' understanding of and ability to communicate with livestock audiences.

Implications

As livestock and other agricultural industries continue to grow and technology evolves, the importance of science to agriculture and the role of magazines in disseminating the most advanced information to producers only will increase. A gap exists, however, in research about the information needs and value of scientific information to producers. This gap has created a need for more studies of producers' information needs, although the media preferred by producers has been well established. With this study, a beginning comparison now can be made between livestock publications editors and their audiences.

Editors of livestock publications may be able to compare their practices for making gatekeeping decisions and learning about their respective sectors of the larger livestock industry to the information provided by their peers. It also may create a greater awareness of the influences on their decisions, as well as how those decisions coincide with previously reported preferences of producers for information and sources of information.

This study creates a foundation for additional studies of agricultural gatekeepers and audiences, particularly if and how information needs are being met in the face of rapid advancements in the science and technology of agriculture. As communicators involved in all types of agricultural media consider the positive results of this study and the deficiencies it revealed, steps can be taken to ensure information flows efficiently from scientists to producers to bring the greatest possible benefits throughout agriculture.

Keywords

agriculture, media, gatekeeping, magazines, science

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