

# Brazilian milling industry views on law requiring iron fortification of wheat flour\*

## *A visão da indústria brasileira moageira do trigo sobre a legislação que obriga a fortificação das farinhas com ferro*

### ABSTRACT

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*Anemia caused by iron deficiency is very prevalent in Brazil, and so the government decided that wheat flour should be fortified with iron. This paper presents the perceptions of the wheat milling industry on the Brazilian law which determines flour fortification. Professionals responsible for implementing the law, and representing 60% of the Brazilian wheat flour market, were interviewed and the answers analyzed using the method of Collective Discourse of the Subjects. This method combines the main ideas of the subjects, using their own verbal expressions, to reveal their perceptions. Interpretation of the results showed that millers agree with the law; however they complained about the authoritarian way in which it was introduced. They had previously asked the government for advertising to educate the consumers, but this was not done. The millers do not believe that the population of low socioeconomic status will be benefitted by this law because of the high cost of wheat-derived products. The millers say they are observing the law, in spite of initial technological deficiencies. These have been solved by using the services of micronutrient suppliers and over-dosing the flour. Wheat flour for domestic use is usually fortified with reduced iron, but other iron compounds are used in the flour supplied to industry. In the perception of the millers, the fortification issues are more administrative and political than technical.*

**Keywords: Anaemia, Iron deficiency. Wheat flour fortification. Brazilian law.**

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## RESUMEN

*Debido a la elevada prevalencia en el país de anemia por déficit de hierro, el gobierno brasileño decidió implantar la fortificación de la harina de trigo con este elemento. Este trabajo expone la opinión de la industria molinera sobre la resolución que determina la fortificación. Fueron entrevistados los profesionales responsables por la implementación de la medida que suministran 60% de la harina al mercado brasileño. Las respuestas se analizaron utilizando el método del Discurso del Sujeto Colectivo. Este método combina las principales ideas de los entrevistados para revelar sus opiniones sobre el tema. El análisis de los resultados mostró que los molineros están de acuerdo con la legislación, pero no concuerdan con la forma autoritaria como fue presentada. Ellos habían solicitado al gobierno la realización de propaganda educativa de los consumidores, que no fue realizada. La industria no cree que la población de bajo poder adquisitivo será beneficiada por la medida, debido al elevado costo de los derivados de trigo. Afirman estar cumpliendo la legislación, a pesar de las dificultades tecnológicas, que han sido resueltas con sobredosis de micronutrientes en las harinas. La harina de trigo para uso doméstico es generalmente fortificada con hierro reducido, pero otros compuestos de hierro son usados para la harina industrial. El juicio que la industria tiene es que los problemas de fortificación son más políticos y administrativos que técnicos.*

**Palabras clave: Anemia ferropriva.  
Fortificación de harina.  
Legislación brasileña.**

## RESUMO

*A anemia provocada pela deficiência de ferro tem alta prevalência no Brasil e, assim sendo, o governo decidiu fortificar a farinha de trigo com ferro. Este trabalho apresenta a percepção da indústria moageira do trigo sobre a Resolução brasileira que determina a fortificação. Profissionais responsáveis pela implementação da legislação e que fornecem 60% da farinha do mercado brasileiro foram entrevistados e suas respostas foram analisadas usando o método do Discurso do Sujeito Coletivo. Este combina as principais idéias dos entrevistados, usando suas expressões verbais para revelar suas percepções sobre o assunto. A interpretação dos resultados mostrou que os moleiros concordam com a legislação, no entanto reclamam sobre a forma autoritária como esta foi apresentada. Eles haviam solicitado ao governo que realizasse propaganda para educar os consumidores, mas isto não foi feito. A indústria não acredita que as populações de baixo poder aquisitivo serão atendidas pela legislação, devido ao alto custo dos produtos derivados do trigo. Eles afirmam estar cumprindo a legislação, apesar das dificuldades tecnológicas, que têm sido resolvidas com a sobre-dosagem na farinha dos micronutrientes, cujos fornecedores incluem serviços laboratoriais. A farinha de trigo para uso doméstico é geralmente fortificada com ferro reduzido, mas outros compostos de ferro são usados para a farinha industrial. Na percepção da indústria, os problemas da fortificação são mais político-administrativos que técnicos.*

**Palavras-chave: Anemia ferropriva.  
Fortificação de farinha.  
Legislação brasileira.**

## INTRODUCTION

Anemia is currently by far the most important disease caused by lack of a micronutrient. It affects 2 to 3 billion individuals worldwide. In developing countries, 52% of pregnant women, 39% of children below 4 years of age and 48% of those between 5 and 14 years old are anemic. World Health Organization (WHO) data shows that 2,150,000 pre-school children are at risk of iron deficiency, with consequences for their mental development, including apathy, irritability, and reduced capacity for concentration and learning (WORLD HEALTH ORGANIZATION, 2005).

In Brazil, the incidence is similar to that informed by WHO. Figures from the Brazilian National Agency for Sanitary Surveillance (ANVISA) show that the illness affects approximately 50% of children up to 5 years of age, 20% of adolescents and up to 30% of pregnant women (BICHO, 2004).

Szarfarc, Stefanini and Lerner (1995), analyzing data from the 1960's to the 1990's, found that the occurrence of iron-deficiency anemia in Brazil had increased significantly over this period, irrespective of the methodologies used by the researchers. This emphasizes the urgency for the introduction of control measures. The most worrying results were found among children aged up to 24 months, with an incidence of 77%, followed by pregnant women with 65% and schoolchildren with 54%. The authors indicated food fortification as one of the most efficient ways of preventing iron-deficiency anemia, both for the general population and for specific groups. They commented that putting this into effect would require political decisions, careful and specific legislation, and the cooperation of the food industry. They noted that government programs for supplementing foods suffer from several problems, such as discontinuity, inability to reach the target population, lack of previous research on acceptability, cost and efficacy, and dependency on public funding, which is not always available and is regulated by political decisions. They suggested that supplementation programs should be associated with the offer of various iron-fortified foods to the market, being such a fortification regulated by an enforced legislation.

## FORTIFICATION OF FOODS WITH IRON TO REDUCE THE PREVALENCE OF ANEMIA

Fortification of foods with iron is used to reduce the prevalence of iron-deficiency anemia in populations with diets low in bioavailable iron or unable to obtain suitable sources of this micronutrient, for either economic or other reasons.

The strategy of fortifying staple foods is recommended when the high prevalence of anemia is widely distributed throughout all social classes and not only in the population at risk. The latter consists mainly of infants, adolescents and pregnant women (SZARFARC; STEFANINI; LERNER, 1995; STOLTZFUS; DREYFUSS, 1998).

## THE BRAZILIAN LAW ON FORTIFICATION OF FLOUR WITH IRON

In Brazil, the “Multi-institutional Commission for the Implementation and Management of the Fortification of Wheat and Corn Flours and their Products” was established (BRASIL, 2002) with the aim of integrating and coordinating all the sectors involved in the flour fortification. The commission comprises representatives of the government, the milling industries and other institutions.

Mandatory fortification of wheat flour with iron was established by ANVISA through Resolution RDC nº 344 (BRASIL, 2002), which superceded Resolution RDC nº 15/2000 (BRASIL, 2000). The latter permitted the addition of iron, whilst the new law enforced the fortification of flour with 42 mg iron per Kg.

## ASPECTS OF THE CURRENT CONSUMPTION OF FLOUR, BREAD AND MACARONI IN BRAZIL

The results of the Survey on Family Incomes (POF) in 1987/88, 1995/96 and 2002/03 published by the Instituto Brasileiro de Geografia e Estatística (2004) show interesting changes in the eating habits of Brazilians. There has been a general reduction in the *per capita* food consumption at home. Table 1 shows information on the consumption of wheat flour, macaroni, bread and prepared foods over this period.

**Table 1 – Annual *per capita* amount of some foods bought for home consumption, according to the POF for 1987/88, 1995/96 and 2002/03**

Food product	Annual <i>per capita</i> amount (kg)		
	POF 1987-1988	POF 1995-1996	POF 2002-2003
Wheat flour	4.085	3.102	2.625
Macaroni	4.274	4.084	4.251
Bread rolls	20.163	18.399	17.816
Prepared foods	1.376	2.718	5.398

Source: IBGE, 2004.

It can be seen that wheat flour is among the foods whose consumption fell the most between 1987/88 and 2002/03, with a reduction of almost 36%. On the other hand, the consumption of prepared foods increased approximately four times in the same period, even though the home consumption of bread rolls decreased by 11.6%.

Bakery products correspond to almost 11% of the food costs at home (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2004).

## **ASPECTS OF THE BRAZILIAN WHEAT FLOUR MARKET**

The Brazilian wheat milling industry is composed of more than 200 mills, spread across the whole country, but concentrated in the South, the traditional wheat producing area. It has a capacity of over 15 million tonnes, most of it located in the South-East. The ten largest milling firms produce more than 50% of the national total (ROSSI; NEVES, 2004).

The objective of this research is to reveal the opinions of the wheat milling industry - the sector regulated by Resolution RDC 344/2002 (BRASIL, 2002), which rules the fortification of wheat flour with iron - to ensure the sector understood this strategy.

The results should show how this regulated sector perceives the health measure introduced to reduce iron-deficiency anemia in the country and should contribute to the understanding of regulatory bodies with respect to the development and application of health standards.

## **MATERIAL AND METHODS**

A Collective Discourse (CD) (LEFÈVRE; LÈFEVRE, 2003) data bank was constructed from the transcriptions of recorded interviews with representatives of the national milling industry. In the discourses, the regulated sector talks about its interest in the subject and its responsibilities with respect to the standard required by law. Through these discourses, we seek information on the technical measures adopted by the industry in response to the new legislation.

## **FUNDAMENTALS OF THE COLLECTIVE DISCOURSE METHOD**

According to Lefèvre and Lefèvre (2003, p. 13): “[...] if an individual has a thought (or opinion, or belief, or vision, or perception, or representation), a collection of individuals will show a statistical distribution of this thought [...]”.

The thoughts of individuals and groups are better described when collected, processed and presented in the form of a discourse, “because thoughts belong to the family of speech and language, and consequently to the order of discourse or text”. When a person, or a group of people, has a thought about a particular theme, they adopt, or use, one or more discourses about the theme. “[...] When the thing that people express is a thought, an idea, or an opinion, the speech is always a discourse [...]” (LEFÈVRE; LÈFEVRE, 2003, p. 14).

The Collective Discourse (CD) is a way of presenting qualitative information obtained through interviews. It consists of a text, organized by the researcher, about the principal ideas present in the most significant verbal expressions extracted from the testimonies of the subjects interviewed. Key expressions of a central idea can be collected from the various testimonies; these comprise one or more discourses which synthesize the understanding of the group about a determined theme (LEFÈVRE; LEFÈVRE, 2003).

## **CHARACTERISTICS OF THE GROUP INTERVIEWED**

The survey was based on the market share of the wheat mills where the interviewees worked. The group interviewed is significant with respect to the volume of wheat flour sold in the Brazilian market.

The Brazilian Associations of the Wheat Industry (ABITRIGO) and the Pasta Industry (ABIMA) indicated members who were active in the technical and political procedures of iron fortification and whose firms held a significant part of the Brazilian market. Apart from these Institutions, some of the main suppliers of iron and folic acid in the market indicated directors and technologists of various mills, who were included in the interviews.

The interviewees are all responsible for taking decisions on the fortification process in the mill and therefore have a good knowledge about suppliers of dosing equipment and micronutrients, their use and quality control, as well as about flour distribution and the interests of their clients. They are the main group responsible for implementing the legislation, thus enabling fortification to be carried out in practice.

The interviewees included representatives of the largest wheat milling firms in Brazil, as well as some medium-sized companies, so that various opinions of the sector were covered and the research could be more representative.

When the market shares of the firms providing the participants are combined, they represent approximately 60% of the total market. Therefore, it can be said that the CDs obtained in this research show the opinions of millers who represent approximately 60% of the Brazilian wheat milling market.

Table 2 lists the characteristics of the individuals interviewed. For ethical reasons, the identities of the interviewees and their employers are omitted.

**Table 2 – Characteristics of the individuals interviewed**

Individual	Gender	Age (years)	Length of employment (years)	Geographical region	Profession	Position
A	M	46	25	S	Chemical engineer	R & D manager
B	M	41	12	SE	Food engineer	Vice President of Technology
C	M	45	10	SE	Agricultural engineer	Industrial Director
D	M	49	15	SE	Agricultural engineer	Director of Institutional Relations
E	M	30	13	SE	Chemist	Quality and Development Manager
F	M	55	39	SE	Economist	Manager of Finances and Supplies
G	F	33	14	SE	Veterinarian	Quality Coordenator
H	F	50	15	NE	Chemical engineer	Quality Manager
I	F	37	5	S	Food engineer	Quality and Development Manager
J	F	39	14	NE	Food engineer	Quality and Development Manager

M = male, F = female; NE = North-east, S = South, SE = South-east.

## THE INTERVIEW

A series of interviews were carried out between December 2004 and March 2005. They were arranged through telephone by the first author of this article. The content and objective of the interview, not revealing the actual questions, was sent by e-mail.

The telephone interviews were recorded and later transcribed exactly as they were spoken. The interviewer's telephone was specially adapted for recording and the subject was informed of this from the first moment of recording. The recordings were made available to the subjects.

## THE QUESTIONS

Two open questions were presented, both with an initial statement. The first question explored the considerations of the National Agency for Sanitary Surveillance (ANVISA), drawn up in the introduction to Resolution 344/2002, which state the reasons why this legislation is necessary. The second question was about the general principles of the Technical Regulation, annexed to the Resolution.

### Question 1:

Studies, international recommendations and the Brazilian need for reducing the risk of anemia and congenital malformations have led ANVISA to make the fortification of wheat flour with iron and folic acid mandatory.

What is your opinion on this Brazilian legislation?

### Question 2:

The responsibilities of the wheat flour producers according to this legislation are:

- to guarantee a determined quantity of iron and folic acid in the flour,
- to use a bioavailable iron compound,
- to guarantee the shelf life of the flour and
- to change the labels to give appropriate information.

How have these requirements been fulfilled by you and your firm?

## RESULTS

The titles given to each *Collective Discourse (CD)* representing the ideas that resulted from the question 1 and 2 are shown in the tables 3 and 4.



**Table 3 – *Collective Discourse* resulting from question 1 and respective number of interviewees (N) that mentioned the central idea**

Title (Central Idea)	N
Time of publication of the legislation	3
Fortification in other countries	4
The authoritarian approach of the Government	5
Importance of ABITRIGO	3
Disagreement about the way in which the Resolution was created and presented, because of:	
• lack of information to the regulated sector,	10
• lack of an education programme for the consumer,	10
• the guaranteeing of a market to the producers of micronutrients.	10
Flour fortification as a market opportunity	1
Agreement with the compulsory fortification	8
The social responsibility of the mills	3
Social and health problems in Brazil and the Brazilian consumption of bread and pasta	5
Questions about the efficiency of the measure for the reduction of anemia in low socio-economic classes	3

**Table 4 – *Collective Discourse* resulting from question 2 and respective number of interviewees (N) that mentioned the central idea**

Title (Central Idea)	N
Compliance with the law	10
Technology of wheat mills in Brazil	4
Choice of equipment for addition of micronutrients	8
Responsibility of the suppliers	6
Quality and concentration of the fortifying compounds	8
Type of iron and control of its concentration	8
Concentration of folic acid and its stability	3
Lack of an official method to measure folic acid	8
Enforcement by the sanitary surveillance institutions	3

The content of all the CDs can be summarized as follows:

The Wheat Milling Industry thinks that Resolution 344/02 came at the right time, since the strategy of fortification was already in place in other countries and had given good results. However, the Industry considers authoritarian the way in which the law was presented by the government, and this feeling, associated with technical problems, left the sector on the sidelines, suspicious and demanding an education program for the consumer as the government's part of the bargain. The Industry agrees on the fortification strategy and understands that it is a social act, but it is doubtful whether this measure will reach the poor population because of the high cost of products derived from wheat.

The legislation has been observed and the technological difficulties of the mills in dosing and control measures have been resolved by adapting the production lines and using high-quality micronutrients provided by suppliers with their own laboratory services. Over-dosing has been practiced to overcome technological problems and the lack of adequate laboratory monitoring in the mills. Reduced iron is the most used product in the fortification of flour for domestic use, whilst various types of iron are used for industrial flours, depending on market requirements. The efficiency of folic acid dosing has been questioned, as there is no safe and cheap analytical monitoring. The Industry expects the Sanitary Surveillance institutions to answer their questions and to enforce the legislation.

Due to space reasons, not all the CDs are presented. However, the most mentioned ones for each question are discussed in the following section.

Most mentioned *Collective Discourse* for question 1: Disagreement about the way in which the Resolution was created and presented, due to lack of information to the regulated sector

*The Brazilian law is copied from a system based on research that needs to have a better defined methodology.*

*People do not agree with the way in which things were done. It is a natural development, but could have been presented and instituted in a better way. The program was badly designed, but necessary. It should have been worked out better.*

*Initially, the lack of information to the mills about potential problems in the products caused by fortification led to a movement against the legislation. Everyone was very worried because the daily work of the mill is producing flour to make bread, which is a very hard work. Bakery itself is not a problem because the product is sold very quickly.*

*The whole sector was afraid that some of our products would be damaged. Flour already has other additives. The great question was: what will happen to the market? How will iron affect the final product of our clients?*

*It would have been better if, before going through with the legislation, the mills were properly consulted. It could have been corrected and extended to other B complex vitamins,*

*which have shown good results in other countries. Folic acid should be added, but there should have been a wider discussion.*

*The people who discuss these laws should be a little more tolerant. If it is mandatory, the firms must be able to obey. The idea would have been very welcome if all the requirements were fulfilled.*

*The one who has to do it was not able to express himself clearly. On the control side, the people in the industrial sector still have many unanswered questions.*

*What is going to happen to the biscuit and macaroni industries?*

*One thing is to sell a product in São Paulo; another thing is to take a biscuit and send it to Manaus in a truck. It arrives there and stays another 8 or 10 months on the supermarket shelf. What will happen to it, we don't know.*

*And what about the woman who makes fritters? These are the questions.*

*It's been almost a year since we began making the additions and I see that many of our fears were actually unfounded. Everything is much easier now that it's become a routine.*

#### **Most mentioned Collective Discourse for question 2: Compliance with the law**

*Obviously the legislation is in force and we always obey the law. The legal requirements of Resolution 344 were all fulfilled as soon as the law was passed. From the moment that it became mandatory, the mill really obeyed and this was done for all the flours.*

*We are complying with this rigorously; we implemented the program far before the time limit. We were among the first to get the fortified product on the market; so the program was carried out faithfully and from the beginning.*

*From June 18th, 2004 on, all the flours have been fortified: those for industrial and domestic use, the pre-mixed ones. In fact, all our wheat-flour-based products were already following the legislation.*

*Everyone is afraid of being exposed for not having carried out the fortification, so they want to do it right. We started doing the additions in the mills within the time limit, on the first day of the new legislation.*

*It was no problem to obey, because it already existed in our industry. We were technologically prepared. We had had an enriched flour for more than 3 or 4 years.*

*The process, the selection of dosing equipment and the iron analyses have been carefully carried out in practice. We were getting ready to have 100% of our product fortified.*

*Depending on the type of wheat you use in the milling, there are natural variations in the iron content of the flour. We are not taking this into consideration. We are simply assuming that there is no iron present and adding the amount necessary to conform to the legislation.*

*We are getting a good response, at least with respect to the iron, which fits the standard of 4.2 mg Fe/100g flour. We are getting about 5 to 6, with a very good margin of error in relation to the standard.*

*Since the legislation was implemented, we have always found values within what we actually expected. Iron and folic acid are indeed in our products. We are confident of this. What we, as a company, could do to fulfill the legal requirements, we have done. We have fulfilled them.*

*So that we have no doubts that we are complying with the law, we are paying a little more for the mix. We opted to work with a trustworthy supplier, so that we would have no doubt that we were obeying the legislation.*

*As far as the labeling goes, the layout was replaced. Most of our products already have the new layout. Those that don't, it's because we have permission from the Ministry of Health to use up the old packaging so that we don't have this additional cost, so it is not difficult to obey the law.*

*It's a nuisance in the case of some low-turnover products, of which we have larger stocks of packaging, and to have obeyed the law has made us increase our costs.*

*Big companies have no financial problems. They have technical problems.*

*We know exactly that we have everything controlled up to the factory gates. We don't know what might happen to the product that will be transformed into some derivative.*

## **DISCUSSION**

### *Collective Discourse* resulting from question 1 with respect to the disagreements

The central idea noted by all the interviewees in their replies to question 1 was the disharmony between the creation and the presentation of the Resolution. Disharmony was motivated by: the lack of information to the regulated sector, whose CD is presented in item 3.2, the lack of an education program for the consumer, and the guaranteeing of a market to the producers of micronutrients.

Although the Collective Subject complains about lack of information, they had, in fact, already signed two documents in 1999 and 2002, through their professional society, ABITRIGO, undertaking to fortify flours with iron to assist the fight against anemia (BRASIL, 1999, 2002). In addition, the fortification of flours with iron was regulated by a non-mandatory legislation (BRASIL, 2000).

There was, and still is, a psychological resistance within the sector against the mandatory nature of fortification, which appears to come from distrust in government decisions and also from their belief that lack of education causes the population to reject fortified foods. The latter aspect directly affects the main interest of the manufacturers, which is the volume of sales.

The resistance could also be due to the lack of propaganda, which would increase the number of consumers and, consequently, the interests of the Industry. If the products are not advertised and their consumption thus not increased, the strategy of fortification does not work out. Lofti et al. (1996) comment on the importance of regarding fortification as a business opportunity, since it diversifies the companies' products. They also note the importance of advertising in creating a consumer demand.

An education program on the consumption of nutritious foods and government propaganda on fortified flour have been pointed out as important factors in the fight against iron-deficiency anemia. It is correctly supposed that propaganda in the mass media would increase the consumption of fortified flour and, consequently, the efficiency of the action. This idea is corroborated by the fact that the consumption of wheat flour and bread rolls in Brazilian homes has been diminishing over the last few years, although this reduction may be explained by the elevated proportion of the family food expenses that has to be spent on bakery products (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2004; ROSSI; NEVES, 2004).

Nutritional education is necessary. The choice of food is frequently made on the basis of availability, price, personal preference and food habits, which involve culture, tradition and taboos. A lack of knowledge on nutrition and its role in health and illness makes change difficult. Nutritional education is, therefore, an essential part of any program aimed at combating nutritional deficiencies. However, knowledge alone is not sufficient to guarantee that people will eat a balanced diet. It is also necessary to provide the motivation to adapt, and encouragement for new habits can be given through institutional publicity campaigns on the radio and TV, in newspapers and by other means (BLUM, 2003).

### *Collective Discourse* resulting from question 2 with respect to obeying the law

All the interviewees said that they were complying with the law. Although they considered that fortification was correct from the social and public-health points of view, they also confessed that fear of the company's name exposure or of a health inspector's raid were additional reasons for obeying the law.

They behave as though they do not participate in an integrated chain of production when they affirm that they recognize the quality of fortification of their products, but not that of their clients. The millers seem to have a closer relationship with the micronutrient suppliers than with their industrial clients.

## **CONCLUSIONS**

The objectives of this research were attained. The Collective Discourses of Brazilian wheat millers with respect to their perception of the legislation on flour fortification with iron were constructed. They reveal the importance of the milling industry in this strategy to reach its objective.

The CDs indicate that it is necessary to clarify the objectives of fortification to the flour-producing Industry. They need to be told that the objectives are more related to an unperceived lack of micronutrients in the general population that causes health problems, regardless of social class; the objectives are less related to chronic hunger, caused by the socioeconomic condition of a section of the population.

Mandatory flour fortification was considered a great introduction that could lead to changes in the prevalence of anemia in the country, and it seems reasonable that the following actions should help to make this strategy effective:

- rigorous enforcement of the law with respect to industrial processes and products, to fulfill the expectations of the regulated sector, reducing their doubts, standardizing the technologies used and guaranteeing that iron and folic acid are really present in the products through fiscal analyses;
- management of the whole process by a professional team, together with the mills, to rectify their rejection of the strategy caused by lack of information and by the authoritarian way the law was introduced, facts so greatly complained about in the CDs;
- management of the strategy in the form of a well-planned program including public information campaigns in the mass media and not just a transitory advertisement in the press.

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