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Quality control of food products purchased by the National School-Feeding Programme in Pernambuco, Northeast Brazil, from 1985 to 1988

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SUMMARY. The effectiveness of the Quality Control System (QCS) implemented by the Fundação de Assistência ao Escolar (FAE) for quality control of food products from different types and origins purchased by the National School-Feeding Programme (NSFP) in Pernambuco, Northeast Brazil, was evaluated. Physicochemical, microbiological, microscopical and organopetical analyses were performed in 4,860 food samples and the main causes of alterations were detected. Perishability was the characteristic used for distribution of food items into 3 main groups: A, B, and C. In accordance with 972 Quality Certificates between 1985 and 1988, 31.89 of the samples were rejected. The main reasons for rejection were innacuracies of net weight and drained weight and high moisture contents. Group B presented the smallest number of altered samples (27%); for Groups A and C these values were 33% and 44%, respectively. Our data lead to the conclusion that the QCS implemented by FAE is of paramount importance for an adequate quality control of foods provided to beneficiaries and for a good cost effectiveness of the school-feeding programme.

RESUMEN. Control de calidad de los alimentos adquiridos por el programa nacional de alimentación al escolar en Pernambuco, Noreste de Brasil, entre 1985 y 1988. La efectividad del Sistema de Control de Calidad (SCC) utilizado por la Fundación de Asistencia al Escolar (FAE), y las principales causas de alteraciones de alimentos de diversos tipos y origenes fueron evaluadas utilizando varios parámetros y atributos (físico-químicos, microbiológicos, microscópicos y sensoriales) en 4.860 muestras de alimentos. Los alimentos fueron distribuidos en tres grupos principales, de acuerdo con su susceptibilidad a contaminación y perecibilidad: Grupo A: azúcar, frijoles, arroz, aceite, y sal; Grupo B: galletas, bizcochos, chocolate, harina de mandioca, harina de maíz, leche en polvo desnatada, tallarines, jarabe de azúcar de caña, sardinas en lata y «xerem» (maíz molido); Grupo C: pescados y carnes secas y saladas. De acuerdo con los 972 informes de especialistas, entre 1984 y 1988 fueron rechazadas 31,89% de las muestras. Las principales razones para rechazo, en los tres grupos, fueron engaño en el peso neto y alto tenor de humedad. Por grupo, las principales razones para rechazo fueron la clasificación de los granos, la presencia de hongos y levaduras y las características organolépticas, en los grupos A, B y C respectivamente. El grupo B presentó la menor proporción de alteraciones: 27%. Esta proporción fue de 33 y 44% en los grupos A y C. Estos resultados enfatizan la necesidad de continuar con el SCC, esencial para el control de los alimentos ofrecidos a los beneficiarios y para asegurar un índice costo/beneficio aceptable para el Programa.

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INTRODUCTION

Approximately 25 millon children from state elementary schools are covered by the National School-Feeding Programme (NSFP).

Periodically, foods to be used in the student's diets are purchased by all state governments. Diets are prepared according to food availability and food habits of each region and meet from 15 to 30% of nutritional needs of the children (2, 6).

The huge quantity of foods led authorities to intensify the control of these goods on delivery for assuring adequate quality standars. So, the Fundação de Assitência ao Escolar (FAE) has been implemented, from 1985, a quality control system (QCS) for supervision and control of the foods distributed by the NSFP. Accredited laboratories, the so called Basis Units (BUs) (n=24), most of them operating in Brazilian universities and/or research institutes, account for this control which includes collection inspection, and analysis services.

Criteria were established for these services to allow an uniform operational procedure of the QCS throughout the country. These criteria are described in two manuals (4, 5).

The purpose of this study was to investigate the effectiveness of the QCS after 4 years implementation in Pernambuco.

MATERIAL AND METHODS

A total of 4,860 samples of food from several types and origins (972 lots) was collected, inspected and analyzed between 1985 and 1988.

According to perishability degree foods were distributed into three main groups (Table 1): Group A (the least perishable goods: sugar, beans, rice, oil, salt), Group B (moderately perishable goods: biscuits, chocolate, manioc flour, corn, meal, dried skim milk, macaroni, sugar-cane syrup, canned sardines, «xerém» (ground corn) and Group C (the most perishable goods: dried and salted fish and meat).

The size of the lots depend on perishability of foods. The maximun size of the lot was 200,000 units for foods included in Group A; for Groups B and C maximun sizes were 100,000 and 50,000 units, respectively.

On delivery, ten representative sampling units were taken from each lot; five were analyzed and the rest was kept for eventual re-evaluation.

Physicochemical, organoleptical, microscopical and microbiological analyses were performed by the Laboratory of Food Sciences, Department of Nutrition, Health Science Center, Federal University of Pernambuco. Specific methodologies for each type of food were used. (5).

TABLE 1.
FOOD DISTRIBUTION ACCORDING TO PERISHABILITY DEGREE

GROUP A	GROUP B	GROUP C
Sugar	Biscuit	Dried and salted meat
Rice	Chocolate	
Beans	«Xerém» (*)	Dried and salted fish
Vegetable oil	Manioc flour	
Iodized salt	Corn-flour and pre-cooked Corn-flour	
	Powdered milk	
	Macaroni	
	Sugar-cane syrup	
	Canned sardines	

(*) Ground corn

Results were transcribed to the correspondent Quality Certificate and compared with standard values (4). For final conclusion, compliance and non-compliance with standars were assessed.

The inspection plan by attribute adapted by the QCS presents the following characteristics: (1)

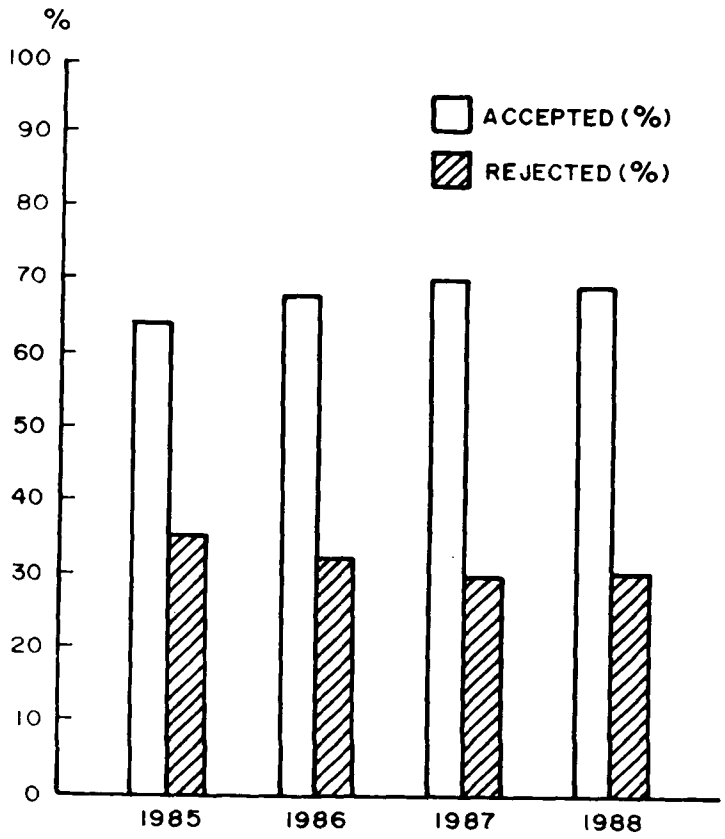
Inspection level S1: this is a special type of inspection adapted to our System and used solely when the size of the sample is relatively small. (7)

Acceptable quality level (AQL): 6.5. (3) Acceptance occurred when critical alterations were not present in the food and/or when an acceptable alteration was detected in the food. Rejection occurred when only one critical alteration and/or two or more acceptable alterations were present in the food.

RESULTS AND DISCUSSION

Data from Quality Certificates (n=972) are shown in Table 2. When results are analyzed a whole a sligh decline in the rejection levels of food samples was observed from 1985 to 1987, with a tendency towards stabilization in 1988 (Fig. 1).

FIGURA 1
Percentages of accepted and rejected food samples
(1985-1988)



This situation, however, changes when data are analyzed per food group (Fig. 2). In 1988, rejection levels declined for Group B and increased for Groups A and C. To the addition of dried fish to the Programme diets was ascribed this change (Table 2). Most of the experts had rejected this product (Table 3) because moisture contents and organoleptic properties did not comply with the FAE standards. These two factors, together with vaccum absence in packages and reduction of maturation period (incomplete curing), contributed also to the rejection of several lots of dried and salted meat which was already included in Group C.

About 31.89% of the total samples did not comply with the standars and were rejected. According to the expert's criteria for determining quality, the highest and the lowest values for quaity were found in samples of Group B and C, respectively; intermediate values were detected in Group A. Group B presented the smallest number of altered samples (27%); the main reason for this alteration was the presence of microorganisms. For groups A and C these values were 36% and 44%, respectively.

The main reasons for rejection of foods in Group A were inaccuracies of the net weight (i.e. the weight of the sample was lower than that indicated by the label), followed by, in a drecreasing order, unsatisfactory grain classification, high moisture contents and the presence of insects. As far as we know, improper moisture contents and the presence of insects reduce shelf-life and, consequently, affect adversely nutrient supply and food safety.

Physicochemical, microbiological, microscopical and organoleptical alterations were not related to either type or origin of food samples.

The improvement of acceptance levels for Group B samples seems to be due to the technical assistance given by our BUs to state noodle industries, reducing the number of microorganisms found in these food products, specially macaroni.

Inaccuracy of net weight, resulting in a decrease of the «per capita» food consumption at sacrifice of the objetives and costs of the Programme, was the main reason for rejection during this period.

TABLE 2
NUMBER OF EXPERTS' REPORTS

GROUPS	FOOD	1985			1986			1987			1988*		
		A	R	TOTAL	A	R	TOTAL	A	R	TOTAL	A	R	TOTAL
A	Sugar	18	06	24	20	02	22	27	03	30	15	14	29
	Beans	08	05	13	05	02	22	27	03	30	04	10	14
	Rice	06	11	17	13	10	23	24	08	32	07	13	20
	Vegetable oil	02	01	03	12	00	12	10	01	11	09	00	09
	Iodized salt	—	—	—	05	00	05	—	01	01	07	03	10
B	Biscuits	00	02	02	40	01	41	41	03	44	55	01	56
	Chocolate	01	03	04	01	09	10	00	01	01	04	00	04
	Manioc flour	19	01	20	11	03	14	11	08	19	14	04	18
	Corn meal	14	07	21	04	04	08	06	06	12	06	21	27
	Powdered milk	00	01	01	—	—	—	—	—	—	04	00	04
	Macaroni	03	07	10	28	10	38	44	25	69	32	01	34
	Sugar-cane syrup	16	00	16	19	09	28	—	—	—	12	04	16
	Canned sardines	02	01	03	07	06	13	10	10	20	02	00	02
	«Xerem» (ground corn)	04	03	07	07	03	10	—	—	—	07	04	11
C	Dried and Salted Fish	—	—	—	—	—	—	—	—	—	00	10	10
	Dried and Salted Meat	00	03	03	21	22	43	10	02	12	20	03	23

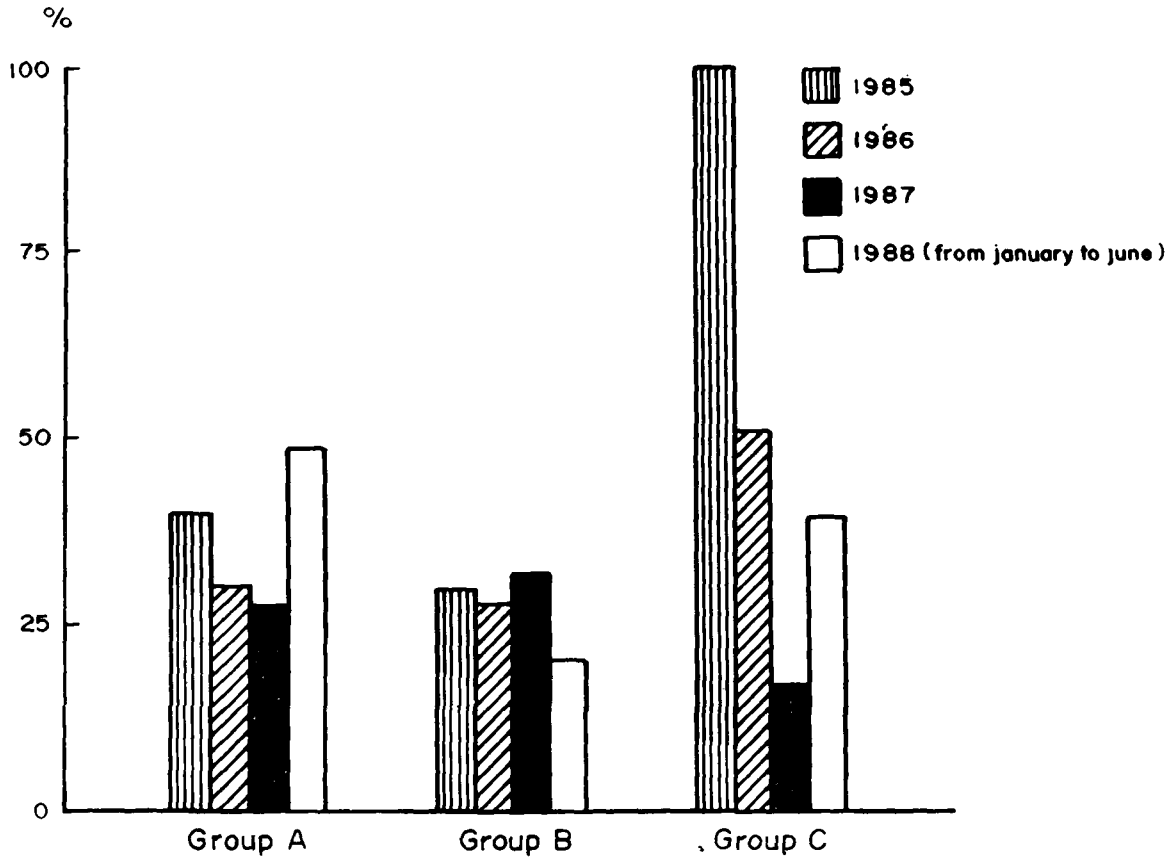
A = Accepted
R = Rejected
(*) From January to June

TABLE 3 - CAUSES OF ALTERATIONS

ANALYSES \ FOOD GROUPS	Sugar	Beans	Rice	Oil	Salt	TOTAL (A)	Biscuits	Chocolate	Manioc flour	Corn meal	Milk	Macaroni	Sugar-cane syrup	Canned sardines	«Xerem»	TOTAL (B)	Dired and salted fish	Dried and salted meat	TOTAL (C)
1 PHYSICOCHEMICAL																			
Water absorption	-	-	-	-	-	-	-	-	-	22	-	-	-	-	-	22	-	11	11
Fat layer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chlorides	-	-	-	-	01*	01	-	-	-	-	-	-	-	-	-	-	-	-	
Cooking	-	01*	-	-	-	01													
Packing	-	-	01	01	-	02	-	-	-	01	-	01	-	-	-	02	-	06*	06
Iodide	-	-	-	-	01*	01	-	-	-	-	-	-	-	-	-	-	-	-	-
Total insolubles	-	-	-	-	01	01	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	-	-	-	-	-	-	-	07	-	-	-	-	-	-	-	07	-	-	-
Weight and/or volume	18	15	18	01	02	54	07	-	11	04	-	12	04	14	04	54	-	12	12
Rancidity	-	-	-	01*	-	01	-	-	-	-	-	-	-	-	-	-	-	01*	01
Ash	-	-	-	-	-	-	-	07*	-	-	-	-	01	-	-	08	-	03	03
Saccharose	07	-	-	-	0-	07	-	-	-	-	-	-	-	-	-	-	-	-	-
Inhoff's sediment	-	-	-	-	-	-	-	03	-	-	-	-	-	-	-	03	-	-	-
Humidity	01	08*	02*	-	01*	12	-	01*	-	01	01	05*	-	-	01*	09	08*	-	08
2 MICROBIOLOGICAL																			
Coliform	-	-	-	-	-	-	-	-	-	05*	-	-	-	-	-	05	-	-	-
Mould and yeasts	-	-	-	-	-	-	-	-	03	07*	-	23	03	-	-	36	-	-	-
Standard counting in plates	-	-	-	-	-	-	-	-	-	-	-	05	-	-	-	05	-	-	-
Salmonella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01*	01	-	-	-
3 MICROSCOPICAL																			
Grain classification	-	-	28	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-
Dirtiness larvase and parasites	-	08*	-	-	-	08	-	-	02*	02*	-	03	08*	03	01*	19	-	-	-
4 ORGANOLEPTICAL																			
Aspects, colour, odour and taste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	01*	11*	12	

(*) Critical alterations

FIGURA 2
Rejection levels of food groups analysed by the QSC
(1985-1988)



CONCLUSIONS

Our data lead to the conclusions that:

1. A decrease in the frequence of alterations in foods distributed by FAE in Pernambuco was shown after the QCS implementation;
2. the technical assistance to state food industries reduced the causes of alterations in Group B foods; and
3. that the QCS implemented by FAE is of paramount importance for beneficaries' protection and for a good cost/effectiveness of the school-feeding programme.

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