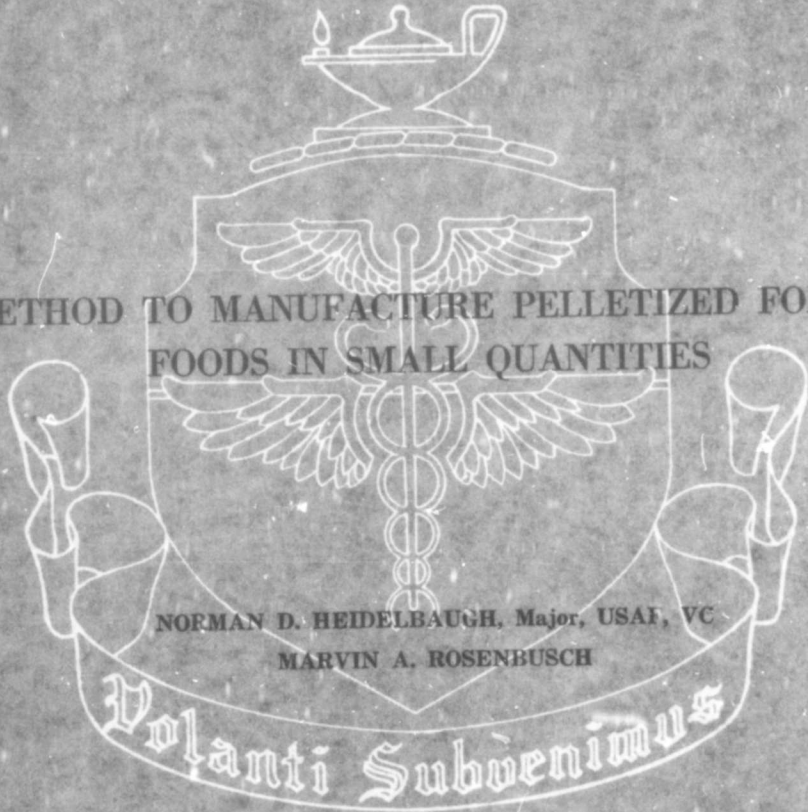


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# A METHOD TO MANUFACTURE PELLETIZED FORMULA FOODS IN SMALL QUANTITIES



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**NORMAN D. HEIDELBAUGH, Major, USAF, VC**  
**MARVIN A. ROSENBUSCH**

## FOREWORD

The research reported in this paper was conducted by personnel of the Physiology Branch and the Technical Service Branch, under task No. 775903. The work was accomplished between June 1966 and May 1967. The paper was submitted for publication on 12 June 1967.

This report has been reviewed and is approved.

*James B. Nuttall*

JAMES B. NUTTALL  
Colonel, USAF, MC  
Commander

## ABSTRACT

A pelletizer was developed for manufacturing pellets from powdered formula food. Details for the construction of the pelletizer are presented.

Tests on the use of the pelletizer showed it to be practical for production of small quantities of pellet foods such as might be needed in scientific studies involving feeding of human subjects.

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# A METHOD TO MANUFACTURE PELLETIZED FORMULA FOODS IN SMALL QUANTITIES

## I. INTRODUCTION

Scientific studies employing human subjects frequently require accurate definition of nutrient intake. To fulfill this need, a nutrient-defined powdered formula food was developed consisting of the ingredients shown in table I.

TABLE I  
*Powdered formula food—SMBP 10D\**

Ingredients	Weight (gm.)
Powdered skim milk	40
Sucrose	20
Lactose	20
Dextrose and maltose†	100
Coffee whitener‡	100
Sodium caseinate	17.5
Sodium chloride	1.5
Magnesium oxide	0.1

\*Provides 444 kcal./gm.

†"Dextro-Maltose Formula No. 1," Mand Johnson and Company.

‡"Coffee-Mate," Carnation Company (corn syrup solids, vegetable fat, sodium caseinate, dipotassium phosphate, emulsifier, sodium silico-aluminate, artificial flavor, artificial colors).

The powdered food was designed so as to be easily reconstituted with water to make a liquid drink. There was also a need to have this same formula available for feeding in solid form. In order to convert the powdered formula into solid form, a method of pelletization was developed.

The design and use of a pelletizing device for powdered formula food are described in this paper. The pelletizer produced highly palatable

bite-size food pellets from the powdered formula described. These pellets could be eaten without need for rehydration. The pelletizer can be used for production of bite-size solid food pellets from other powdered formulas.

## II. MATERIALS AND METHODS

A powdered food pelletizer was designed consisting of five pellet compression shafts, a compression shaft guide, a pellet die, and an extruded pellet retainer ring. The design for the pelletizer is shown in figure 1.

A pelletizer was manufactured from 303-type stainless steel in accordance with this design (fig. 2). Figure 3 shows an exploded view, and figure 4 shows the individual parts of the pelletizer.

Food pellets were manufactured using the pelletizer by placing the pellet die on the base-plate of a laboratory hydraulic press and filling the die compartments with the powdered formula. Excess powder was then scraped level with the top of the die by use of a rubber spatula. As a result of this leveling, each compartment contained approximately the same amount of powder. The compression shaft guide was then set in place on top of the die after which the five compression shafts were set into the guide holes. The press was operated to apply a total pressure between 15,000 and 20,000 lb. depending on the desired texture of the pellet. Then the pressure was released and the pellet expeller ring placed under the die. The press was again activated to drive the compression shafts through the pellet die to expel the finished pellets inside the pellet retainer ring.

Several variations of powdered formulation were used to test the feasibility of using the pelletizer with other proportions of ingredients



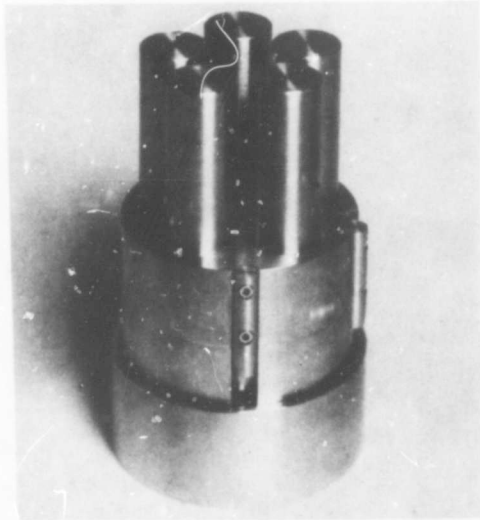


FIGURE 2

*Assembled view of powdered food pelletizer.*

used in formula powder. Powders ranging from 12% to 30% fat and 35% to 48% sugars were tested.

### III. RESULTS

Two individuals, working 30 minutes, were able to manufacture sufficient pellets from formula SMBP 10D to supply 5,600 kcal. Pellets prepared from this formula had a highly acceptable chewable consistency when manufactured by use of 8,000 p.s.i. on the pellet surface. Hedonic score ratings of the pellets by 24 untrained tasters were greater than those for the liquid form of the food, mean 6.8 as compared to 6.2. Pellets produced in this manner from the described formula approximated 2.6 gm. each, providing approximately 11.5 kcal. each. It was calculated that if the pellets were compressed into cube shape having the same density, their caloric density would be sufficient to provide 2,600 kcal. from approximately 37 cu. in. of food.

No difficulty was encountered in pelletizing the other formulas tested.

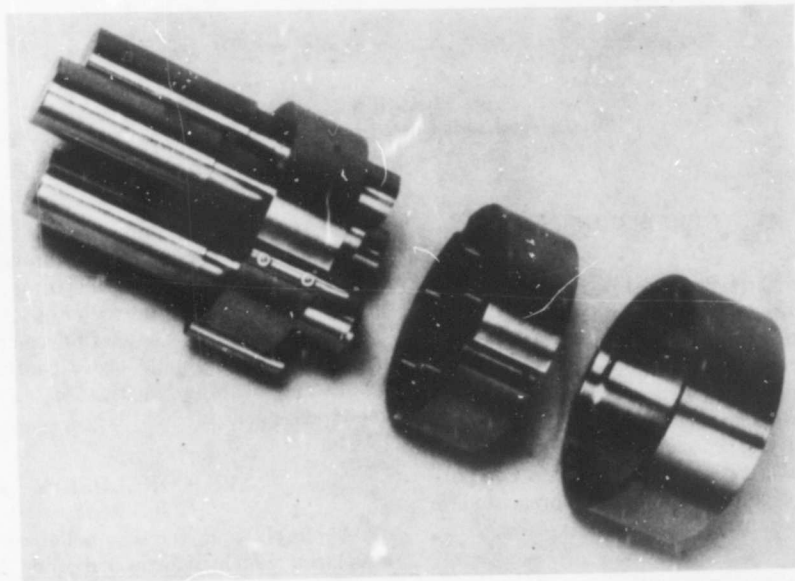


FIGURE 3

*Exploded view of powdered food pelletizer.*

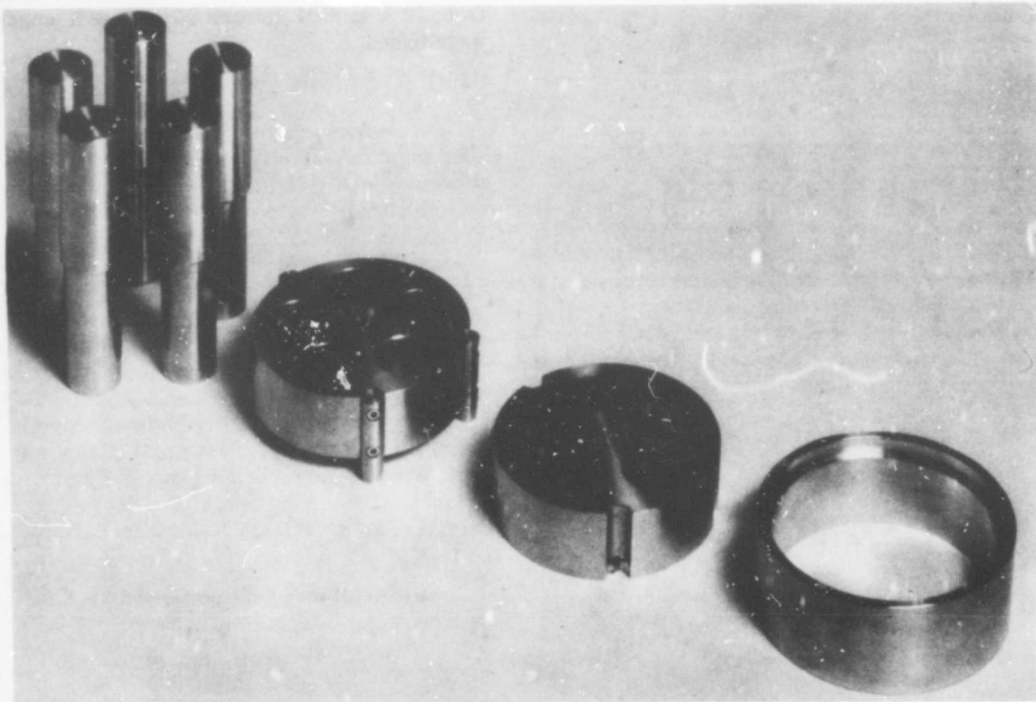


FIGURE 4  
*Disassembled view of powdered food pelletizer.*

#### IV. DISCUSSION

Convenient bite-size solid formula foods can be manufactured by pelletizing powdered formulas. Pelletization affords a method to increase acceptability and reduce food handling problems involved in use of formula powders which require reconstitution to liquid form. The availability of a formula in both liquid and solid forms also provides a means to compare physiologic response to nutrients presented in these different forms.

The pelletizer described in this paper worked well and produced a satisfactory

product when the manufacturing methods described were used. There was no indication that other formula foods consisting of different proportions of the ingredients of the type tested would affect the usefulness of the method. This device should prove useful whenever laboratory scale quantities of solid formula foods are needed.

#### V. CONCLUSION

A simple and reliable pelletizer has been developed which affords a method for production of pellets from formula food powder for studies concerned with feeding human subjects.

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