TI 59 Calculator Program for Haugh Unit Calculation[1]

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ABSTRACT A TI 59 calculator program was written for Haugh unit determination of the albumen quality of eggs. The original equation developed by Haugh (1937) was incorporated into the program. Use of the calculator program gives an accurate and direct reading of the Haugh unit. The program was written so that the data could be recorded by means of an optional printer.
(Key words: Haugh unit, egg quality, albumen quality, programmable calculator)

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INTRODUCTION

The Haugh unit (Haugh, 1937) is a widely accepted measurement of the albumen quality of eggs. The method involves a relationship between egg weight and height of thick albumen as described by a complex equation.

The development of programmable calculators, such as the TI 59 calculator, simplifies the repeated solving of complicated mathematical equations like the Haugh unit formula. The use of a programmable calculator for albumen quality evaluation has an advantage over tables or slide rule methods by offering an accurate and direct calculation of the Haugh unit. In addition a printer (PC-100C) can be used for recording the Haugh unit data.

PROCEDURE AND EXAMPLE

Table 1 describes the steps for implementing the Haugh unit program on the TI 59 calculator. After the program is entered in the calculator, it can be recorded on a TI 59 magnetic card for future use. In depth instructions for recording on magnetic cards and other programming procedures can be found in the calculator owner's manual (Farish *et al.*, 1977).

The following equation (Haugh, 1937; Stadelman and Cotterill, 1977) was used in the development of the Haugh unit program:

$$HU = 100 \log\left[H - \frac{\sqrt{G}(30W^{.37} - 100)}{100} + 1.9\right]$$

where:

HU = Haugh units
H = albumen height in millimeters
G = 32.2
W = weight of egg in grams

The program can be used with or without a printer. Alphabetic characters – GM (grams), MM (millimeters) and HU (Haugh units) – are included in the program to identify the Haugh unit data when using a printer.

Table 2 shows the procedure and an example for using the program. The example involves an egg weighing 58.2 g with a thick albumen height of 5.5 mm. Upon entering the egg weight and albumen height data into the calculator, the Haugh unit was determined to be 73.4.

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TABLE 1. *TI 59 Program for Haugh unit calculation*

Location	Code	Key	Comment	Location	Code	Key	Comment
000	76	LBL	Egg weight	047	93	.	
001	11	A	input	048	02	2	
002	42	STO		049	34	$\sqrt{x}$	
003	01	01		050	65	x	
004	02	2		051	53	(	
005	02	2		052	03	3	
006	03	3		053	00	0	
007	00	0		054	65	x	
008	69	OP		055	53	(	
009	04	04		056	43	RCL	
010	43	RCL		057	01	01	
011	01	01		058	45	Y^x	
012	69	OP		059	93	.	
013	06	06		060	03	3	
014	92	RTN		061	07	7	
015	76	LBL	Albumen height	062	54	)	
016	12	B	input	063	75	−	
017	42	STO		064	01	1	
018	02	02		065	00	0	
019	03	3		066	00	0	
020	00	0		067	54	)	
021	03	3		068	54	)	
022	00	0		069	55	÷	
023	69	OP		070	01	1	
024	04	04		071	00	0	
025	43	RCL		072	00	0	
026	02	02		073	54	)	
027	69	OP		074	85	+	
028	06	06		075	01	1	
029	92	RTN		076	93	.	
030	76	LBL	Haugh unit	077	09	9	
031	13	C	calculation	078	54	)	
032	02	2		079	28	LOG	
033	03	3		080	65	x	
034	04	4		081	01	1	
035	01	1		082	00	0	
036	69	OP		083	00	0	
037	04	04		084	54	)	
038	53	(		085	58	FIX	
039	53	(		086	01	1	
040	43	RCL		087	69	OP	
041	02	02		088	06	06	
042	75	−		089	22	INV	
043	53	(		090	58	FIX	
044	53	(		091	98	ADV	
045	03	3		092	92	RTN	
046	02	2					

TABLE 2. *TI 59 Program instructions for Haugh unit calculation*

Step	Input	Key pressed	Display	Printer
Procedure:				
1.	Enter program			
2.	Enter egg weight (g)	A	Egg weight (g)	Egg weight GM
3.	Enter albumen height (mm)	B	Albumen height (mm)	Albumen height MM
4.	Calculate Haugh unit	C	Haugh unit	Haugh unit HU
Example:				
1.	Enter program			
2.	58.2 (g)	A	58.2	58.2 GM
3.	5.5 (mm)	B	5.5	5.5 MM
4.	Calculate Haugh unit	C	73.37822427	73.4 HU

REFERENCES

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