

## استخدام الاهتزازات الصوتية في تقييم خواص الجودة للبيض

محمود علي محمد ، أيمن حافظ عامر عيسي ، محمد علي أبو عميرة ، أحمد توفيق طه ،

حسام الدين مصطفى

قسم الهندسة الزراعية - كلية الزراعة - جامعة المنوفية

### USING ACOUSTIC RESONANCE FREQUENCY IN EVALUATION FOR EGGS QUALITY PROPERTIES

**M.A. Mohamed , A.H. Amer Eissa, M.A. Aboamera, A.T.Taha and H. Moustafa**

Department of Agricultural Engineering, Faculty of Agricultural, Menoufiya University.

(Received: Apr. 14, 2012)

**ABSTRACT:** *The incidence percent of broken and cracked eggs ranged from 6% to 8% of all produced eggs. Breaking force strength has proven to be closely related to the proportion of broken eggs but the relationship with non-destructive measurements is not yet clear. Therefore, the relationship of resonance frequency and the dynamic stiffness with breaking force strength was measured as a non-destructive alternative. It seems to be necessary, to develop other measurements for estimating eggshell quality without destroying the egg shell. Four samples of 437 eggs, collected from the poultry farm, Faculty of Agriculture, Minoufiya University, first sample consisted of Norva and Sina, (129 and 68 eggs, respectively), second was collected from El Wady Company for poultry production, Hie-linen and Lohman (120 for each strain) and were used for analysis, acoustic impulse (using an acoustic crack detection device), besides measuring the breaking force strength. Calculations from dynamic stiffness have stronger influences on breaking force strength. Shell breakage strength, shell thickness, dynamic stiffness and shell mass had the best coefficients of correlation. Also it was the best assessment for practical large scale uses, because the characteristics of egg shell quality changes from strain to another. Intact eggs produced sound signals mainly exhibiting a single dominant peak in the frequency range of 430 and 8613Hz with signal duration of about 112 ms. The cracked eggs showed frequency spectra in relatively wider frequency range of 1420 to 12,273Hz and shorter signal duration of about 5ms. It was concluded that, the influence of the material strength (breakage force) upon total eggshell strength (crack detector) is limited. The commercial egg measurements showed that, dynamic stiffness accurately predicted which eggs would crack as they passed through the gathering and processing system. Thus the method could be used to sort out eggs likely to crack and remove them prior to cartooning.*

**Key words:** *Egg quality, physical egg quality parameters, acoustic resonance frequency, breaking force strength and dynamic stiffness.*