



LubriTose MCC Case Study

Michael Crowley and Amanda Gage – 158 State Highway 320, Norwich, NY 13815
 Michael.crowley@kerry.com - http://www.SheffieldBioScience.com

Introduction

LubriTose MCC is a co-processed excipient that combines Microcrystalline Cellulose (MCC) with a tablet lubricant. The lubricant is integrated into the MCC, resulting in a directly compressible excipient system that eliminates the necessity to use Magnesium Stearate. The product is used in direct compression tablet formulations as a replacement for the compression aid and lubricant. The API and other materials are added in a typical fashion but the need for adding a lubricant in the final blending step is eliminated. The product consists of the following ingredients:

- NF/EP/JP compliant Microcrystalline Cellulose (MCC)
- NF compliant Glycerol Monostearate (GMS)
- The chemical attributes of both products are preserved

Benefits

Eliminates the necessity of using magnesium stearate

- No overblending issues
- Does not leave residue on equipment
- Maintains tablet hardness and dissolution over using Magnesium Stearate

Self-lubricating

- Low ejection forces result in extended tooling life

Excipients are integrated together

- Enhanced flowability and less dust

MCC based

- Excellent tablet hardness and dissolution

Ability to run at high speeds

- Acceptable ejection forces even at high press speeds

High dilution potential for adding API and functional excipients to formulation

- Ability to add API and functional excipients
- Excellent lubrication even at low use level in formula

Study Objective

To show that LubriTose MCC can be used in typical Acetaminophen tablet formulations that result in acceptable tablet hardness, fast dissolution values, and low ejection forces at various press speeds.

Formulas

Formulation #1

Ingredient	mg	%
LubriTose MCC	180	39.56
Acetaminophen	250	54.95
Povidone	20	4.4
Croscarmellose Sodium	5	1.1

Formulation #2

Ingredient	mg	%
LubriTose MCC	400	43.15
Acetaminophen	500	53.94
Povidone	20	2.16
Croscarmellose Sodium	7	0.76

Formulation #3

Ingredient	mg	%
LubriTose MCC	600	46.88
Acetaminophen	650	50.78
Povidone	20	1.56
Croscarmellose Sodium	10	0.78

Table 1: LubriTose MCC dilution in formulas

Formula	% LubriTose MCC in Tablet
1	39.56
2	43.15
3	46.88

Tablet Hardness

Figure 1: Tablet Hardness of LubriTose MCC/Acetaminophen Formulations

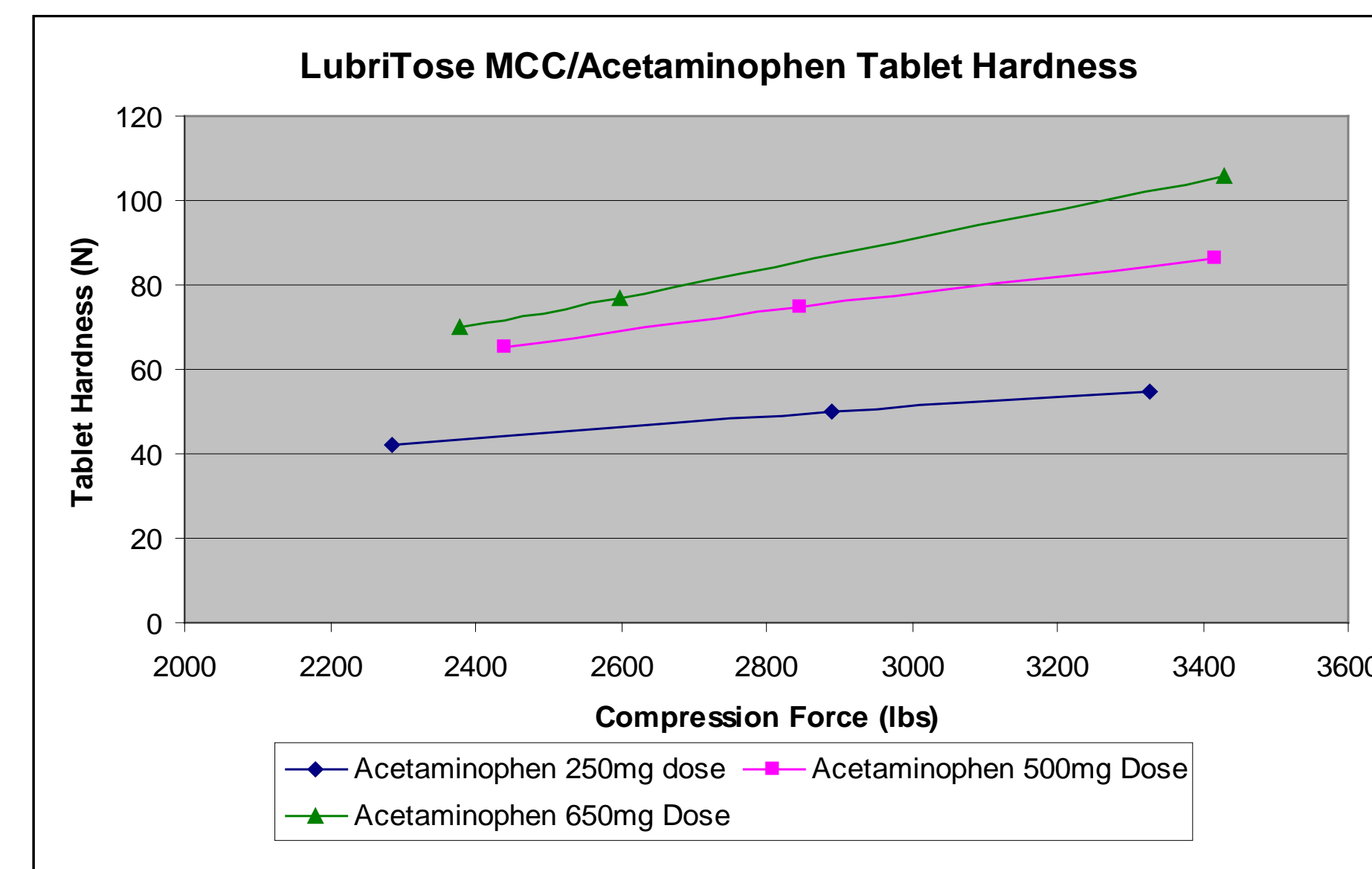


Figure 1 shows that the tablet hardness was acceptable and increased with increasing percentages of LubriTose MCC.

Ejection Force

Figure 2: Tablet Formula Ejection Forces

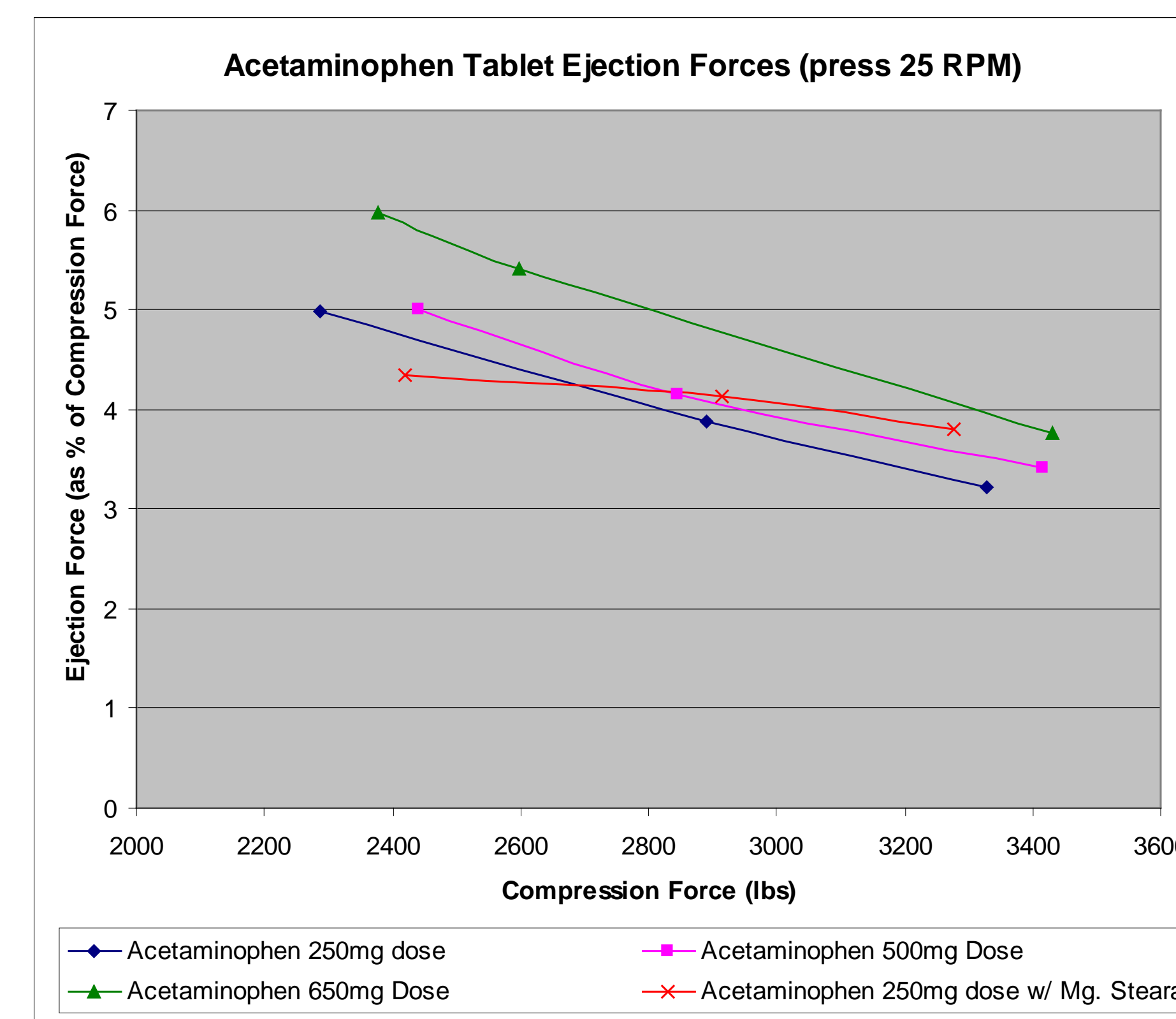


Figure 2 shows the ejection forces of the tablet formulas at a standard press speed versus the standard dose using Magnesium Stearate. No capping or sticking was observed at any of the prepared doses. Also, importantly, ejection forces decreased at higher compression forces, most likely due to the increased heat of compaction and hence melting of the GMS. The curve was more flat when Magnesium Stearate was used. Ejection forces do increase slightly as dose is increased as expected due to the larger tablet surface area.

Dissolution

Figure 3: Dissolution Profile of the LubriTose/Acetaminophen Formulations

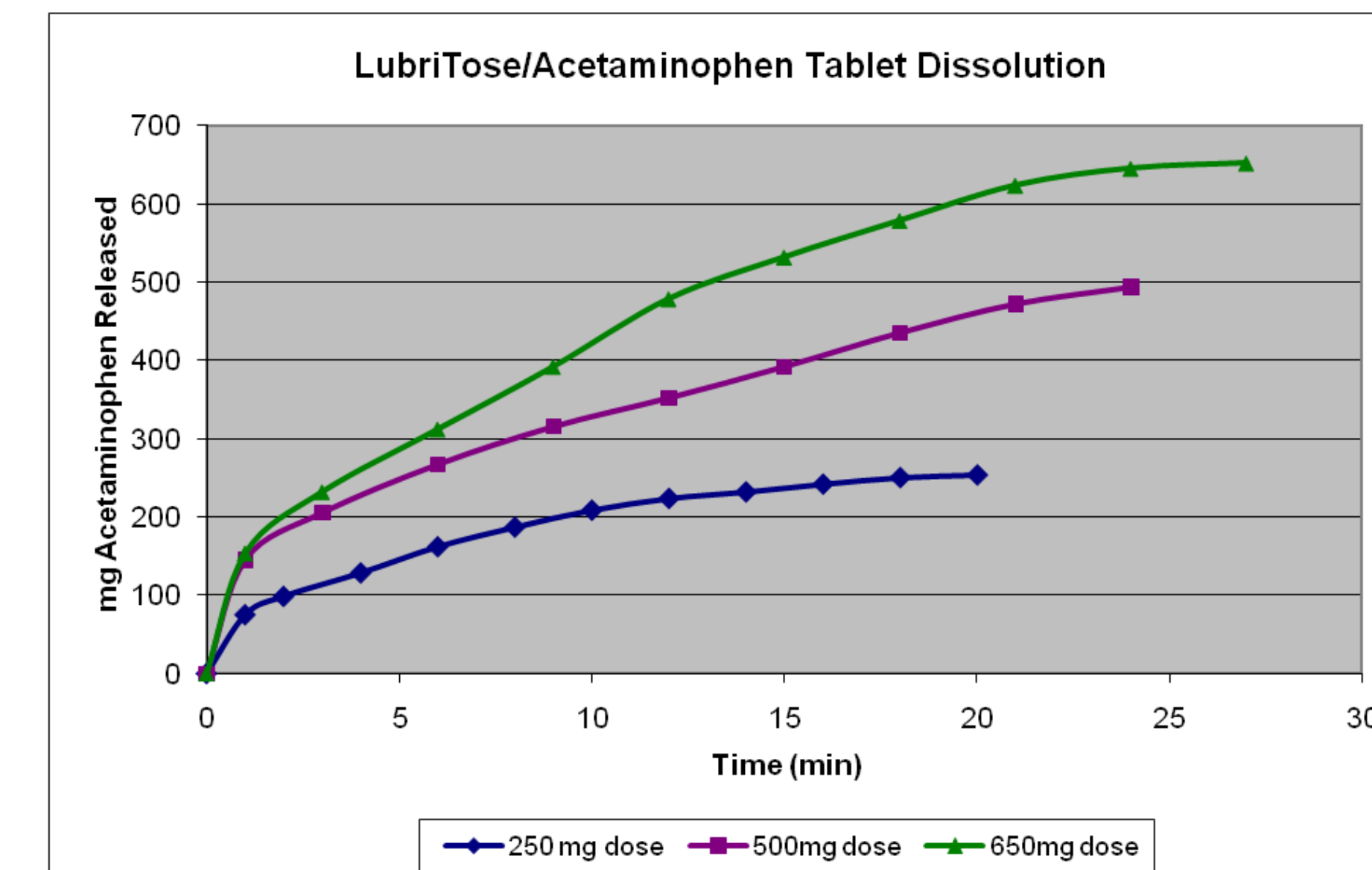


Figure 3 shows that using LubriTose MCC resulted in fast dissolution times that easily met the NF requirement for Acetaminophen of 45 minutes, even at the 650mg dose.

Press Speed

Figure 4: Press Speed/Ejection Force Profile for 250mg Dose

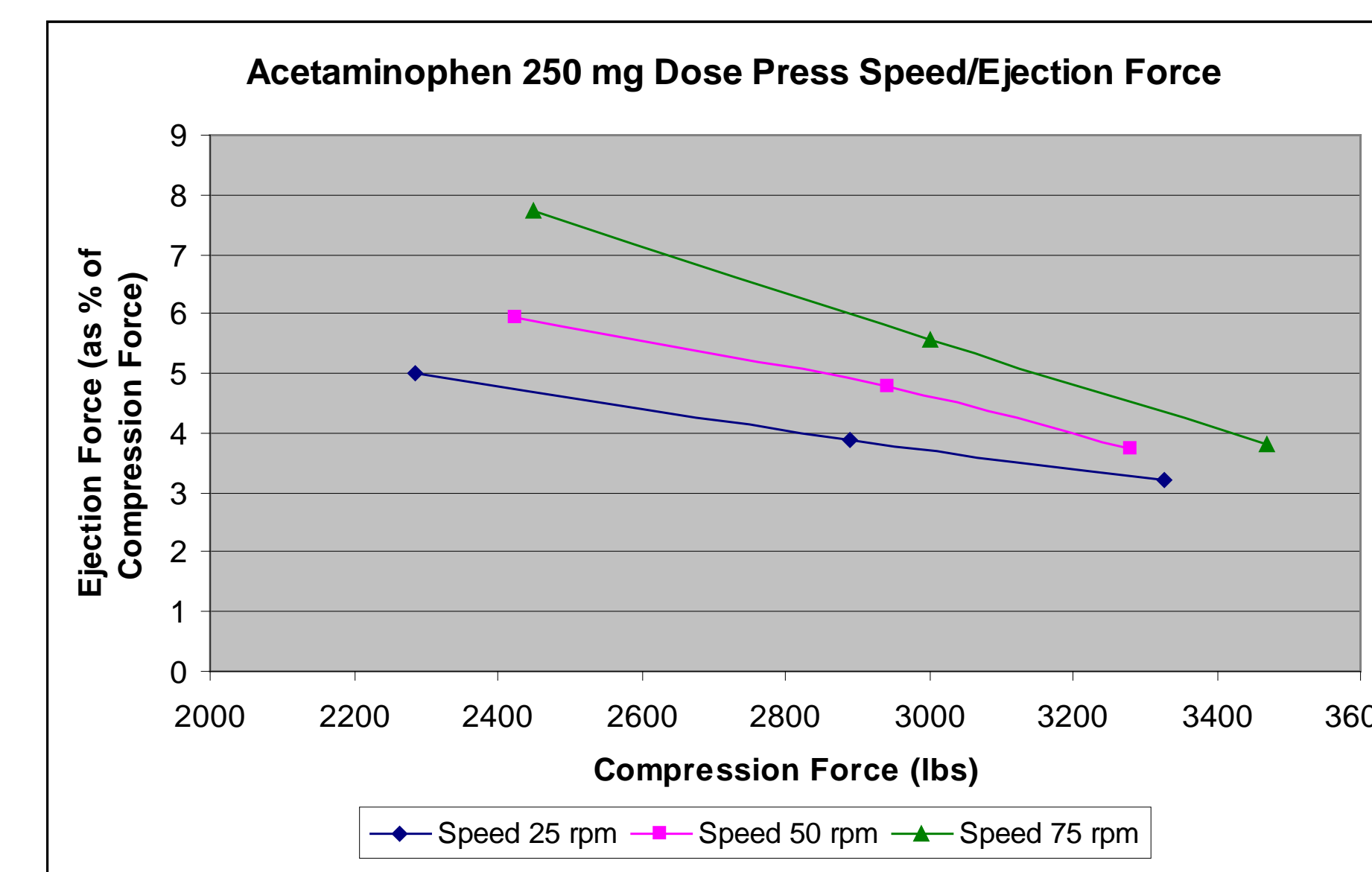


Figure 5: Press Speed/Ejection Force Profile for 500mg Dose

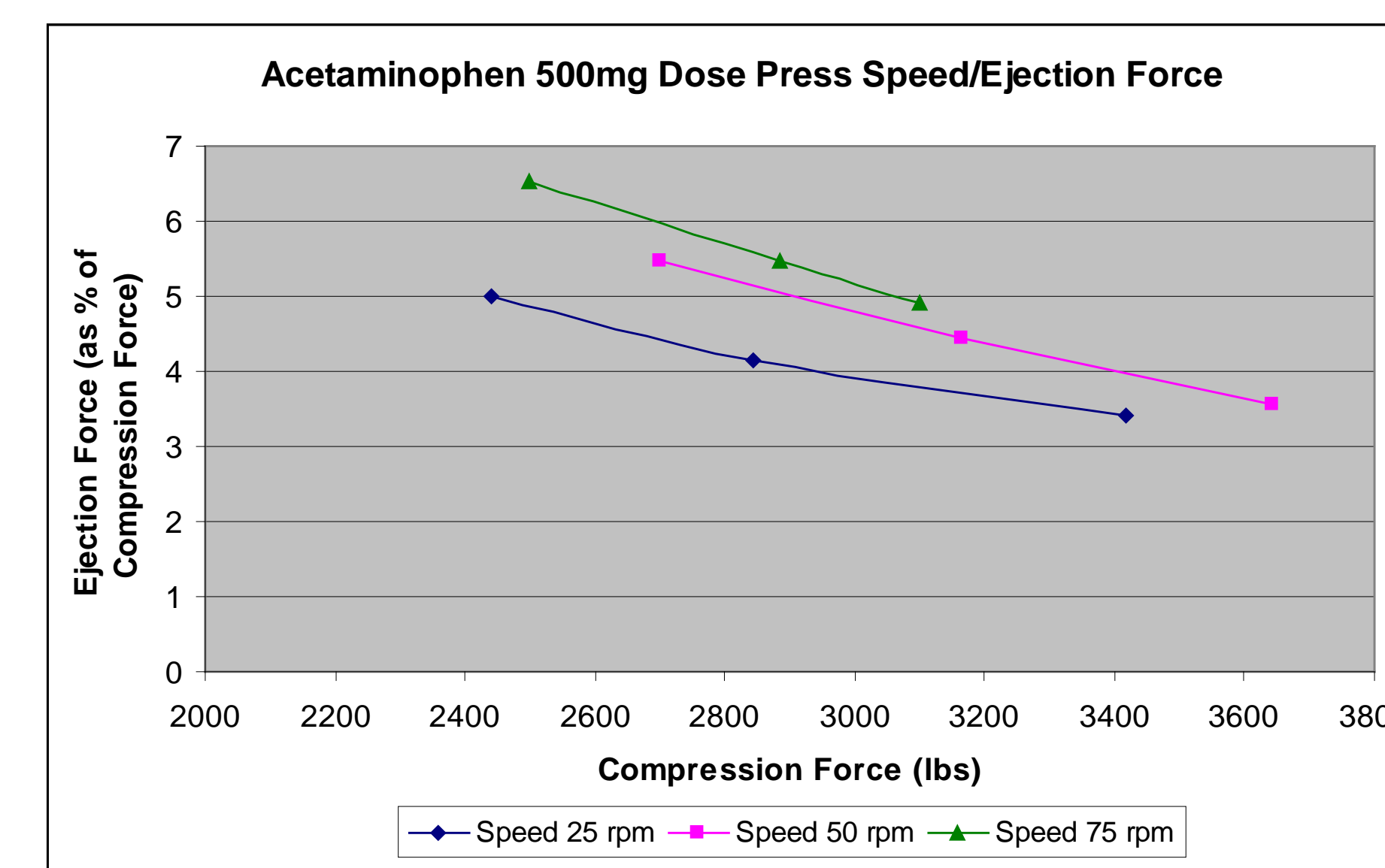
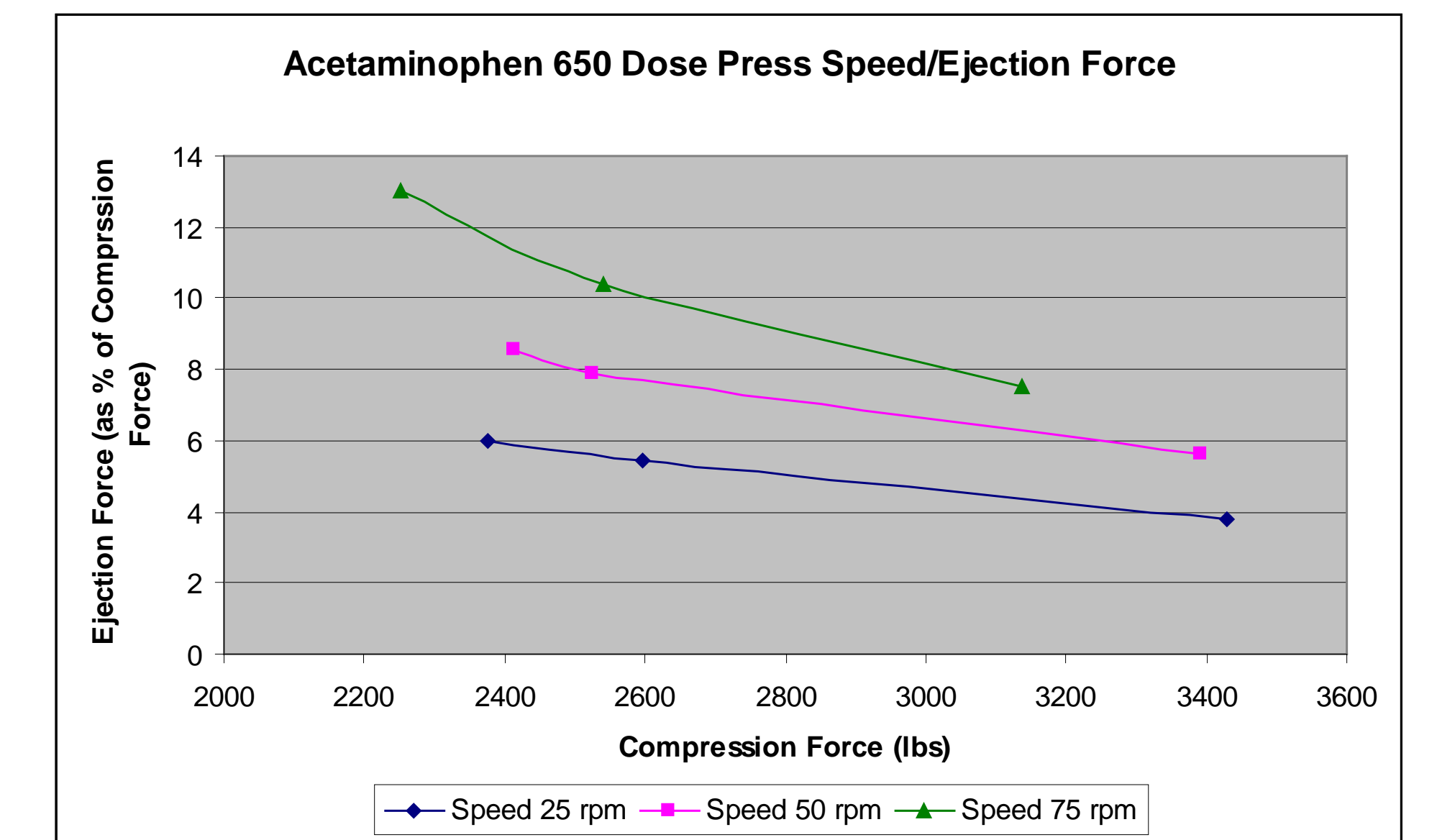


Figure 6: Press Speed/Ejection Force Profile for 650mg Dose



Figures 4, 5, & 6 show the ejection forces of the tablet formulas at increasing tablet press speeds. No capping or sticking was observed at any of the press speeds. Ejection forces also decreased with increased compression forces. Ejection forces do increase slightly at higher press speeds most likely due to lower residence time and hence less melting of the GMS.

Results

The following table highlights the functionality of the three Acetaminophen formulations using LubriTose MCC to replace the compression aid and lubricant.

Formula	% LubriTose	Hardness	Capping/Sticking	Flow	Dissolution Time
1	39.56	Good	None observed	Very good	20 min
2	43.15	Better	None observed	Very good	25 min
3	46.88	Best	None observed	Excellent	27 min

Conclusions

1. The lubrication ability of LubriTose MCC was excellent, even at only ~35% of the tablet formulation. No capping or sticking was observed in any of the formulations.
2. Using LubriTose MCC produced tablets with good hardness in these formulas, which contain a very high API content.
3. The flow was very good in all formulations, enabling run speeds of 75% of press max speed.
4. The tablets using all three formulas resulted in fast dissolutions, easily meeting the NF requirement for Acetaminophen.