Comparing Handspun Romney Wool to Commercial Wool Yarn For Use on the Knitting Machine

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Comparing Handspun Romney Wool to Commercial Wool Yarn
For Use on the Knitting Machine

This in-depth study is presented as a partial requirement
for the Master Spinner Certificate at
Olds College, Olds, Alberta

July 1997

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Summary

This paper includes four sample groups that verify the ways in which handspun yarn can compare with commercial yarn for use on knitting machines.

The results show that the handspun Romney yarns, comparable to commercial yarns in grist, twists per inch, and wraps per inch, can be used successfully on knitting machines.
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INTRODUCTION

Some years ago, I became interested in knitting machines, raising sheep and finally handspinning. After I entered the Master Spinner Program at Olds College, my knitting machines were usually neglected, except for the occasional small project. The majority of my time was spent finishing the requirements for the spinning levels, and, of course, seeing to the sheep every day. I still had my knitting machines, but because I found little documentation on the use of handspun yarns for knitting machines, I decided to research the subject and to devise a project that would include the wool from my Romney sheep. This paper presents and discusses the results of that project.

Four sample groups are used in this comparison of handspun and commercial yarn. Each group has three knit swatches done with commercial yarn and three with handspun yarn. The swatches are knit in Stockinette, Fairisle, and Skip stitch patterns. The four commercial yarns are one hundred per cent wool of different weights and plies. This wool comes from Merino, Nebraska, New Zealand, and Australian sheep. The handspun yarns are also one hundred per cent wool. This wool comes from my flock of Romney sheep, or from commercially prepared Romney roving from New Zealand.

The knitting machines used are the Brother Standard KH 860 and the Bulky KH 260. Both machines have punch card capabilities, which means that a pre-punched card can be inserted in the machine, and, when the proper knobs and buttons are set, it will automatically place the needles in the correct position for the type of knitting chosen.
The Standard and Bulky machines are identical in terms of settings and differ only in
needle size. The Bulky machine has larger needles to accommodate thicker yarn.

Tension for the knit swatches was determined by the yarn’s thickness. Because of my
experience on the machines, I had a fair idea of what tension would be suitable for the different
yarns.

For those who are not familiar with knitting machines I am including a brief explanation
of the Tension Dial on the machine and yarn being used. These remarks are simply a guide line
because the tension must be determined by trying different tensions and determining which one
to use so as not to have the tension too tight or too loose.

The tension dial is graduated from zero to ten with each space being divided into three
parts, that is, 0 dot, dot, 1 dot, dot, 2 dot, dot. The stitch size is determined by adjusting the
tension setting, with zero being the tightest tension and ten the loosest tension. Tension is
adjusted according to the size of the yarn being used. For a very fine yarn such as a commercial
fingering yarn start at the low end of the tension dial on the Standard machine. A commercial
double knitting weight yarn would require the high end of the tension dial. Yarn thicker than a
commercial double knitting requires the low end of the tension dial on the Bulky machine.

The yarn for this project was dyed with Gay Wool dye, Indigo. I used approximately ½
teaspoon of dye to each pot of water (just enough water to let the skeins move freely) and
simmered the contents at a low boil for thirty minutes, lifting the skeins frequently for the first
ten minutes. The yarns took the dye bath differently. This result did not surprise me as the yarns
were from different wool breeds and were not scoured in the same way.
DISCUSSION

Is it possible to produce handspun yarn that will knit to the same gauge, that is, stitches and rows per inch, as the commercial yarn? Will it have the same appearance? Will the handle be the same? Will the twist per inch and the count be the same? If not, how much difference can there be and still achieve a good result? These are some of the questions I asked myself before beginning my samples.

Before I began spinning, I analyzed the commercial yarns that I would be using. I determined the wraps per inch, twists per inch, angle and count of each yarn. Initially, this research was done by analyzing the yarn just as it came from the retailer. However, after I dyed my first sample group (commercial and handspun) I realized that once the commercial yarn had been washed it changed appearance. Subsequently, all commercial yarns were analyzed before and after washing.

Information given to me by the woollen mills indicated that the commercial yarns used were spun worsted. However, Ann Field, provides this description of worsted yarn spun from a medium/bulky lustrous fleece:

1. It will be smooth, solid and lustrous. If it is held up to the light, none should shine through the yarn.
2. It will be hard-wearing.
3. It should not pill. Pilling is the forming of small balls on the garment surface as small noils and short pieces work their way out but there are no short
fibers in worsted yarn.

4. It will not change greatly with washing. It should not puff up and expand much, or full or mill easily....

5. The twist will be clearly defined.

6. Little or no air will be trapped in the yarn.

7. There is little or no bulk or springiness in this yarn. (96)

In this description of worsted yarn Mabel Ross reveals why it produces such durable and desirable characteristics:

True worsted-spun yarn is prepared from fibers made straight and parallel by combing and it should be a smooth relatively inelastic yarn spun from long fibers of equal lengths. (18)

When I spoke to the woollen mill about the Harrisville two ply commercial yarn, they said that “the wool arrives in a washed condition, where it is put through a picker twice, then carded and arranged into tops.” In other words the fibers are not kept parallel as they would be if combed. Because of this preparation, I consider the Harrisville yarn to be spun semi-worsted rather than worsted. This distinction is also true of the other three commercial yarns because they all changed their appearance in some way once they were washed and the skeins set under tension. Their fiber comes to the mill scoured and prepared into roving or combed top. There was not any information available as to how the wool was handled before the carding process.

It should be noted that Field describes semi-worsted yarn as one being spun from fiber that has been carded into a batt or roving with fibers of different lengths and lying at different
angles to one another. During the spinning process the fibers are drawn somewhat parallel to one another.

Because the manufacturers’ claim is that the yarns are worsted and I spun my samples semi-worsted, the following formula was used to calculate the count on all skeins:

\[
\text{YARDS} \times 454 \times \text{PLY} \div 560 = \text{count}
\]

The availability of one hundred percent wool yarns is somewhat limited in the area where I live. Most of the yarns available from local suppliers are blends (wool/mohair combinations or wool/nylon and wool/polyester combinations) or the wool has been treated for easier washing. I also inquired at stores in Edmonton and Vancouver without success. I finally ordered the commercial yarn from a shop in Calgary. They had six types of one hundred percent wool yarn that I felt were suitable for my research. These yarns ranged in cost from $24.00 to $93.00 (superfine Merino 2/18) a pound. Freight, of course, added to the expense.

Raw fleece can cost from $3.00 to $6.00 a pound. Commercially prepared Romney roving costs from $15.00 to $16.00 a pound. If it is not available locally, then there would also be the added cost of the freight. In a cost comparison one would have to consider shrinkage, time for scouring, preparation for spinning and spinning. One would have to decide what an hour of time is worth and add this to the original cost of the fleece.

Experimentation with the Romney wool began with the scouring process. I washed some lamb’s-wool, wool from a first cut fleece, and wool from an older sheep. The scouring was done by laying the lock’s cut end one way on a layer of netting and then at a 45 degree angle on the
next and subsequent layers. After arranging five to six layers, the wool was inserted into a net washing bag. The bag was dipped into a hot water bath to remove the suint and then put through two baths of water and Ivory Liquid dish detergent. Care was taken to keep the water of each successive bath at the same temperature as the previous bath. Once washed, the wool was put through two rinses and laid out to dry.

I tried different methods of fiber preparation on each of the fleeces I scoured. I combed the locks, combed the locks and elongated them by hand, combed the locks and used handcards, and, finally, opened the locks with a dog comb and put them through a drum carder. I found the last method more time efficient and I felt that it gave a better fiber preparation. For the end result the fiber was prepared on the drum carder.

The above methods were tried on the lamb’s wool, the first cut fleece, and the adult fleece. After spinning small sample skeins from the above, I chose to use the adult fleece because it had a nice crimp and good staple length and carded well on the drum carder.

Using the wraps per inch from the commercial yarn as a guideline, I began my experimentation with handspun samples. At first, I spun only small sample skeins. The skeins were washed and set under tension and compared to the commercial yarn for wraps per inch, twists per inch, and angle. I continued in this way until I had a skein that seemed suitable. At this point, I knit a sample swatch in stockinette stitch, using first the commercial yarn and then the handspun. If the same tension was not accomplished then I adjusted the grist on the singles, making them thinner or thicker. I spun the singles with just enough twist to be cohesive. Once I realized the same stitches and rows per inch with both yarns, I spun enough to complete
the sample group.

I approached each sample group in this manner and found that after doing sample group one that groups two and three came along quite smoothly.

Group four was the most difficult. The commercial yarn is a 2/18 yarn spun from superfine Merino. Because of the fineness and softness of this yarn there did not seem to be the same margin for inconsistency as in the other yarn.
CONCLUSION

By means of concluding, I will revisit the questions raised in the discussion portion of this paper.

I. Is it possible to produce handspun yarn that will knit to the same gauge, that is, stitches and rows per inch?

The knit swatches in all four sample groups, commercial and handspun were knit at the same tension and all realized the same stitches and rows per inch. (See Appendix A,B,C, and D.)

Although the handspun differs from the commercial yarn in that:

1. Wool breeds are different.
2. Fiber preparation is different.
3. Wool is spun on a wheel versus mill equipment.
4. Plying (folding) done with different equipment.
5. Spun yarn was finished differently.

II. Will the handspun yarn have the same appearance as the commercial yarn?

Basically it has the same appearance although the inconsistencies are more apparent in the handspun yarn. (See Appendix A,B,C, and D.) However, if one examines commercial yarns closely there are inconsistencies to be found, albeit slight.
III. Will the handle be the same?

No, I do not feel the handle between the yarns are the same. Different wool breeds enter into the spinning of the commercial yarn. I do not believe it is possible to achieve the same handle if one type of wool comes from a fine wool breed and one from a medium wool breed. (See Appendix A,B,C, and D.)

IV. Will the twist per inch, wraps per inch, and the count be the same? If not, how much difference can there be and still achieve a good result?

Twists per inch are very close on samples one through three. Sample four, handspun, shows a variation of 3 ½ - 6 ½ tpi, while the commercial yarn has a variation of 3 ½ - 4 ½ tpi. Even with this much variation I still realized the same gauge.

All twist per inch calculations were done from the skeins before wrapping the wool on cards. (See Appendix A,B,C, and D.)

Wraps per inch were realized in all four samples. (See Appendix A,B,C, and D.)

Count of the samples varied by + .13 in sample group one, - .99 in sample group two, - 0.04 in sample group three and - 2.2 in sample group four.

The effect of this variation on the knit swatches is that the handspun swatches will have different weights than the commercial swatches. Although the same gauge was realized in the knit swatches, the weight difference of the handspun swatches could make a significant difference in the weight of the finished project.
I believe that it is possible to use handspun yarn on the knitting machines. I see no reason why different fibers should not be used for this purpose. Keep in mind that whatever fiber is chosen, it has to be spun with enough strength to withstand the pull of the tension rod on the knitting machine.

Smooth yarns work best. For instance, mohair yarn tends to catch on the sinkers of the machine. It also loses its fuzzy appearance when used on the knitting machine. Some of this loss can be overcome by brushing the finished garment to raise the nap. Also, a cotton yarn, unless smooth, will tend to form incomplete stitches.

I would recommend handspun yarn on the knitting machine if a specific yarn one desired is not readily available commercially. In this case handspinning the yarn seems a feasible solution.

However, if time is a consideration, I recommend using commercial yarn. For instance, the commercial yarns I used ranged from $24.00 to $93.00 a pound. They cost an average of $51.00 a pound plus freight expenses. If these yarns are in cone form, then they can be threaded directly to the machine. If they are in ball form, they require preparation on a yarn winder. If time is a factor then these considerations would have to be added to the cost.

Romney raw fleece costs $4.50 a pound on an average. Added to this, if time is considered, would be the hours it takes to scour the fleece, prepare the fiber for spinning and the spinning itself. Commercially prepared Romney roving averages around $15.50 a pound. Again, if time is considered, the hours it takes to complete the finished yarn would have to be taken into consideration.
In consideration of the cost factor, there is the sense of accomplishment realized in creating an article, start to finish, from the raw product. Another consideration would be the cost for the commercial yarn versus the raw fleece or commercially prepared roving.

As a further study on this subject, I think it would be very interesting to obtain the raw fiber from the woollen mills and then spin it and compare it to their commercial yarns.
Sample Group 1
Yarns

Commercial Yarn:
Harrisville white 5771 lot 228 8

Fiber Source:
New Zealand wool

Fiber Preparation:
Wool arrives at woollen mill in scoured condition, where it is put through a picker twice, carded and arranged into tops

Spinning Technique:
Worsted

Folding:
Folded on a twister

Finishing:
Yarn wound directly onto cones

Finished Yarn:
Unwashed:
Wraps per inch - 13
TPI - 2 ½
Angle - 14
Count - 3.12

Washed:
Wraps per inch - 11
TPI - 2 ½
Angle - 14
Count - 3.35

Handspun Yarn:
Romney

Fiber Source:
Raw fleece

Fiber Preparation:
Wool was scoured. Locks were combed to open them and carded on a drum carder

Spinning Technique:
Semi-worsted

Ply:
2 ply, done on the spinning wheel

Finishing:
Skeined onto niddy noddy. Skeins washed and set under tension

Finished Yarn:
Wraps per inch - 11
TPI - 2 ½ - 3
Angle - 14
Count - 3.48
HARRISVILLE 2 PLY WOOL YARN
UNWASHED
13 WRAPS PER INCH

HARRISVILLE 2 PLY WOOL YARN
WASHED AND SET
11 WRAPS PER INCH

ROMNEY HAND SPUN 2 PLY WOOL YARN
WASHED AND SET
11 WRAPS PER INCH
Sample Group 1
Knit Swatches

Commercial:

Stockinette Stitch  
Bulky Machine - Tension 2  
5 stitches  
> per inch  
7 rows

Fairisle Stitch  
Bulky Machine - Tension 3  
5 stitches  
> per inch  
5 rows

Skip Stitch Pattern  
Bulky Machine - Tension 1  
5 stitches  
> per inch  
10 rows

Handspun:

Stockinette Stitch  
Bulky Machine - Tension 2  
5 stitches  
> per inch  
7 rows

Fairisle Stitch  
Bulky Machine - Tension 3  
5 stitches  
> per inch  
5 rows

Skip Stitch Pattern  
Bulky Machine - Tension 1  
5 stitches  
> per inch  
10 rows
COMMERCIAL YARN
HARRISVILLE 2 PLY
STOCKINETTE STITCH
BULKY MACHINE TENSION 2

5 STITCHES > PER INCH
7 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
STOCKINETTE STITCH
BULKY MACHINE TENSION 2

5 STITCHES > PER INCH
7 ROWS
COMMERCIAL YARN
HARRISVILLE 2 PLY
FAIRISLE STITCH
BULKY MACHINE TENSION 3

5 STITCHES
* PER INCH

5 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
FAIRISLE STITCH
BULKY MACHINE TENSION 3

5 STITCHES
* PER INCH

5 ROWS
COMMERCIAL YARN
HARRISVILLE 2 PLY
SKIP STITCH PATTERN
BULKY MACHINE TENSION 1

5 STITCHES  → PER INCH
10 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
SKIP STITCH PATTERN
BULKY MACHINE TENSION 1

5 STITCHES  → PER INCH
10 ROWS
Commercial Yarn:
Nature Spun Worsted Weight

Fiber Source:
Nebraska sheep

Fiber Preparation:
Wool arrives at the woollen mill
scoured and prepared into roving

Spinning Technique:
Worsted

Folding:
3 ply -technique not known

Finishing:
Yarn wound directly into ball form

Finished Yarn:
Unwashed:
- Wraps per inch - 12
- TPI - 2 ½
- Angle - 14
- Count - 4.86

Washed:
- Wraps per inch - 10
- TPI - 2 ½
- Angle - 14
- Count - 4.76

Handspun Yarn:
Romney

Fiber Source:
Raw fleece

Fiber Preparation:
Wool was scoured. Locks were
combed to open them and carded on a drum
carder

Spinning Technique:
Semi-worsted

Ply:
3 ply, done on the spinning wheel

Finishing:
Skeined onto niddy noddy. Skeins
washed and set under tension

Finished Yarn:
- Wraps per inch - 10
- TPI - 2 ½
- Angle - 14
- Count - 3.77
Sample Group 2
Knit Swatches

Commercial:

Stockinette Stitch
Bulky Machine - Tension 0
6 stitches
> per inch
8 rows

Fairisle Stitch
Bulky Machine - Tension 1
5 stitches
> per inch
5 rows

Skip Stitch Pattern
Standard Machine - Tension 10
7 stitches
> per inch
12 rows

Handspun:

Stockinette Stitch
Bulky Machine - Tension 0
6 stitches
> per inch
8 rows

Fairisle Stitch
Bulky Machine - Tension 1
5 stitches
> per inch
5 rows

Skip Stitch Pattern
Standard Machine - Tension 10
7 stitches
> per inch
12 rows
COMMERCIAL YARN
NATURE SPUN 3 PLY
STOCKINETTE STITCH
BULKY MACHINE TENSION 0

6 STITCHES
8 ROWS

PER INCH

HAND SPUN YARN
ROMNEY 3 PLY
STOCKINETTE STITCH
BULKY MACHINE TENSION 0

6 STITCHES
8 ROWS

PER INCH
COMMERCIAL YARN
NATURE SPUN 3-PLY
FAIRISLE STITCH
BULKY MACHINE TENSION 1

5 STITCHES
5 ROWS

PER INCH

HAND SPUN YARN
ROMNEY 3 PLY
FAIRISLE STITCH
BULKY MACHINE TENSION 1

5 STITCHES
5 ROWS

PER INCH
COMMERCIAL YARN
NATURE SPUN 3 PLY
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 10°

7 STITCHES
12 ROWS

PER INCH

HAND SPUN YARN
ROMNEY 3 PLY
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 10°

7 STITCHES
12 ROWS

PER INCH
Sample Group 3
Yarn

Commercial Yarn:
   Jaggerspun 2/8 LBH Maine Line wool

Fiber Source:
   Australian-New Zealand (Low Black Hair)

Fiber Preparation:
   The wool arrives at the woollen mill scoured and prepared into combed tops.

Spinning Technique:
   Worsted

Folding:
   2 ply - technique not known

Finishing:
   The spun yarn is scoured after spinning. This is done at a different mill. They couldn’t tell me if the twist is set. The yarn is wound onto cones.

Finished Yarn:
   Unwashed:
      Wraps per inch - 18
      TPI - 3 ½
      Angle - 14
      Count - 7.45

   Washed:
      Wraps per inch - 16
      TPI - 3 ½
      Angle - 14
      Count - 7.09

Handspun Yarn:
   Romney

Fiber Source:
   New Zealand commercially prepared roving

Fiber Preparation:
   Spun directly from roving

Spinning Technique:
   Semi-worsted

Ply:
   2 ply - done on the spinning wheel

Finishing:
   Skeined onto a niddy noddy. Skeins washed and set under tension

Finished Yarn:
   Wraps per inch - 16
   TPI 3 ½ - 4
   Angle - 14
   Count - 7.05
JAGGERSPUN 2/8 LBH MAINE LINE
2 PLY WOOL YARN
UNWASHED
18 WRAPS PER INCH

JAGGERSPUN 2/8 LBH MAINE LINE
2 PLY WOOL YARN
WASHED AND SET
16 WRAPS PER INCH

ROMNEY HAND SPUN 2 PLY WOOL YARN
WASHED AND SET
16 WRAPS PER INCH
Sample Group 3
Knit Swatches

Commercial:

Stockinette Stitch
Standard Machine - Tension 5
9 stitches
> per inch
11 rows

Fairisle Stitch
Standard Machine - Tension 6
9 stitches
> per inch
9 rows

Skip Stitch Pattern
Standard Machine - Tension 4
9 stitches
> per inch
16 rows

Handspun:

Stockinette Stitch
Standard Machine - Tension 5
9 stitches
> per inch
11 rows

Fairisle Stitch
Standard Machine - Tension 6
9 stitches
> per inch
9 rows

Skip Stitch Pattern
Standard Machine - Tension 4
9 stitches
> per inch
16 rows
COMMERCIAL YARN
JAGGERSPUN 2/8 LBH
MAINE LINE 2'PLY
STOCKINETTE STITCH
STANDARD MACHINE
TENSION 5

9 STITCHES
PER INCH

11 ROWS

HAND SPUN YARN
ROMNEY 2'PLY
STOCKINETTE STITCH
STANDARD MACHINE
TENSION 5

9 STITCHES
PER INCH

11 ROWS
COMMERICAL YARN
JAGGERSPUN 2/8 LBH
MAINE LINE 2 PLY
FAIRISLE STITCH
STANDARD MACHINE
TENSION 6
9 STITCHES
9 ROWS

9 STITCHES
> PER INCH

HAND SPUN YARN
ROMNEY 2 PLY
FAIRISLE STITCH
STANDARD MACHINE
TENSION 6
9 STITCHES
9 ROWS

9 STITCHES
> PER INCH
COMMERCIAL YARN
JAGGERSPUN 2/8 LBH
MAINE LINE 2 PLY
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 4

9 STITCHES   ➔ PER INCH
16 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 4

9 STITCHES   ➔ PER INCH
16 ROWS
Sample Group 4
Yarn

Commercial Yarn:
Jagerspun 2/18 Merino (Superfine)

Fiber Source:
Merino (superfine) from Australia or New Zealand

Fiber Preparation:
Wool arrives at woollen mill in combed tops

Spinning Technique:
Worsted

Folding:
2 ply

Finishing:
Yarn scoured after spinning. This is done at a different mill so they didn’t know if or how the twist was set.

Finished Yarn:
Unwashed:
Wraps per inch - 22
TPI - 4 ½ - 5 ½
Angle - 7
Count - 17

Washed:
Wraps per inch - 22
TPI - 3 ½ - 4 ½
Angle - 7
Count - 16.2

Handspun Yarn:
Romney

Fiber Source:
Romney Fleece from my flock

Fiber Preparation:
Scoured and put in roving form commercially

Spinning Technique:
Semi-worsted, spun directly from roving

Ply:
2 ply done on the spinning wheel

Finishing:
Skeined onto niddy-noddy, skeins washed and set under tension

Finished Yarn:
Wraps per inch - 22
TPI - 3 ½ - 6 ½
Angle - 7
Count - 14
Jagerspun 2/18 Merino (Superfine)
2 PLY WOOL YARN
UNWASHED
22 WRAPS PER INCH

JAGERSPUN 2/18 Merino (Superfine)
2 PLY WOOL YARN
WASHED AND SET
22 WRAPS PER INCH

ROMNEY HAND SPUN 2 PLY WOOL YARN
WASHED AND SET
22 WRAPS PER INCH
Sample Group 4
Knit Swatches

**Commercial:**

Stockinette Stitch
Standard Machine - Tension 1
10 stitches > per inch
15 rows

Fairisle Stitch
Standard Machine - Tension 2
10 stitches > per inch
11 rows

Skip Stitch Pattern
Standard Machine - Tension 1
11 stitches > per inch
23 rows

**Handspun:**

Stockinette Stitch
Standard Machine - Tension 1
10 stitches > per inch
15 rows

Fairisle Stitch
Standard Machine - Tension 2
10 stitches > per inch
11 rows

Skip Stitch Pattern
Standard Machine - Tension 1
11 stitches > per inch
23 rows
COMMERCIAL YARN
JAGERSPUN 2/18
MERINO (SUPERFINE)
STOCKINETTE STITCH
STANDARD MACHINE
TENSION 1

10 STITCHES
> PER INCH
15 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
STOCKINETTE STITCH
STANDARD MACHINE
TENSION 1

10 STITCHES
> PER INCH
15 ROWS
COMMERCIAL YARN
JAGERSPUN 2/18
MERINO (SUPERFINE)
FAIRISLE STITCH
STANDARD MACHINE
TENSION 2

10 STITCHES = PER INCH
11 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
FAIRISLE STITCH
STANDARD MACHINE
TENSION 2

10 STITCHES = PER INCH
11 ROWS
COMMERCIAL YARN
JAGERSPUN 2/18
MERINO (SUPERFINE)
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 1

11 STITCHES > PER INCH

23 ROWS

HAND SPUN YARN
ROMNEY 2 PLY
SKIP STITCH PATTERN
STANDARD MACHINE
TENSION 1

11 STITCHES > PER INCH

23 ROWS
Works Cited
